

K-12 Achievement Standards Teacher's Guide

to

Science



Idaho Standards for Achievement

Believe It. Achieve It.



Idaho's Standards for Excellence

IDAHO STATE BOARD OF EDUCATION MEMBERS

Mr. Blake Hall, President
Mr. James Hammond, Vice President
Mr. Roderic Lewis, Secretary
Mr. Paul Agidius
Dr. Marilyn Howard, Superintendent of
Public Instruction
Ms. Karen McGee
Mr. Laird Stone
Mr. Milford Terrell

ACHIEVEMENT STANDARDS BOARD COMMITTEE

Ms. Karen McGee, Chair
Mr. Roderic Lewis
Mr. Blake Hall

COMMISSIONERS

Mr. Larry Andrews, Chair, Meridian
Ms. Christine Wada, Co-Chair, Pingree
Dr. Tom Bitterwolf, Moscow
Ms. Kristin King, Idaho Falls
Mr. Tom Luna, Nampa
Dr. Darrell Marks, Nampa
Mr. Jim McFadden, Idaho Falls

STANDARDS, ASSESSMENT & ACCOUNTABILITY OFFICE

Ms. Carissa Miller
Program Manager
E-mail: cmiller@osbe.state.id.us

Ms. Rita Foltman
Assessment & Accountability Business
Specialist
E-mail: rfoltman@osbe.state.id.us

Idaho State Board of Education
PO Box 83720
Boise, ID 83720-0037
(208) 332-1590
Fax: 334-2632
1-877- 394-8464
www.idahoboardofed.org/saa.asp

This publication was produced by the Idaho State Board of Education. Funds for the project were provided by a grant from the J. A. & Kathryn Albertson Foundation. This is not an official copy of any rules of the Idaho Board of Education and no state general funds were used for this reproduction of the standards. This publication will be provided in an alternative form, upon request. The Idaho Board of Education complies with all American Disabilities Act. March 15, 2002, K-12 Achievement Standards Teacher's Guide, SFAA/13320.

*A Special Thanks to all the volunteers
for their dedication for "Setting the Bar" for Idaho students.*

Aguilar, Pat, Coeur d'Alene, Science	Burgess, Clinton, Boise, Humanities
Allen, Dianne, Desmet, Math	Burke, Julie, Lewiston, Humanities
Allred, Shannon, Pocatello, Language Arts	Byrd, Lilia, Nampa, Humanities
Anderson, Judy, McCall, Humanities	Calkins, Sandra, Richfield, Science
Anderson, Lorna, Blackfoot, Social Studies	Campbell, Cindy, Weiser, Math
Anderson, Marianne, Pocatello, Science	Campos, Jeanne, Nampa, Humanities
Anderson, Paul, Coeur d'Alene, Health	Carson, Sheri, Twin Falls, Health
Andrew, Penny, Boise, Social Studies	Caywood, Susan, Idaho City, Health
Ardinger, Rick, Boise, Humanities	Chandler, Steven, Arco, Social Studies
Astorquia, Rosie, Coeur d'Alene, Math	Chesley, Michael, Burley, Humanities
Austin, Ellen, Rupert, Science	Chojnacky, Debbie, Boise, Humanities
Baerlocher, Corey, Kellogg, Humanities	Christensen, Lynnae, Shelley, Math
Bair, Khristie, Boise, Health	Christensen, Sandra, Aberdeen, Science
Barber, Brian, Meridian, Health	Clute, Loa, Idaho Falls, Health
Barber, Lonnie, Caldwell, Language Arts	Collins, Rick, New Meadows, Social Studies
Barrie, Shirley, Idaho Falls, Social Studies	Combes, Barbara, Preston, Math
Bastian, Janine, Boise, Math	Cook, Crystal, Emmett, Humanities
Batten, Mary Ann, Idaho City, Math	Cope, Stan, Pocatello, Humanities
Bauman, Hazel, Coeur d'Alene, Language Arts	Correia, Gail, Meridian, Health
Berg, Linda, Meridian, Humanities	Cowan, Donna, Emmett, Humanities
Berg, Shauna, Idaho Falls, Language Arts	Cowger, Shari, Twin Falls, Humanities
Bergstrand, Tama, Bonners Ferry, Humanities	Cronnelly, Tim, Cascade, Humanities
Berkey, Kim, Pinehurst, Language Arts	Crosier, Lynne, Shelley, Social Studies
Bielenberg, John, Meridian, Humanities	Crumley, Aartje, Blackfoot, Humanities
Bieze, Judy, Coeur d'Alene, Language Arts	Currie, Lois, Pinehurst, Language Arts
Billetz, John, Post Falls, Science	Currie, Paul, Kellogg, Humanities
Blue, Nancy, Caldwell, Science	Cutler, Ann, Coeur d'Alene, Language Arts
Bodell JoAnn, Idaho Falls, Science	Daniel, Robert, Dubois, Social Studies
Bologna, Mary, Hayden Lake, Language Arts	Danielson, Cindy, Burley, Language Arts
Boots, Eileen, Weiser, Science	Dawes, Kathy, Moscow, Science
Boyer, Jean, Boise, Social Studies	Deering, Barbara, Boise, Science
Brady, Jerry, Idaho Falls, Language Arts	Dickerson, Kathleen, Moscow, Math
Braun, Lorraine, Idaho City, Humanities	Donicht, Terry, Twin Falls, all subjects
Brill, Susan, Mountain Home, Math	Drick, Bonnie, Eagle, Language Arts
Brizzee, Paul, Idaho Falls, Humanities	Eck, Paul, Bovil, Health
Brown, Chris St. Anthony, Social Studies	Edmonson, Cathy, Lewiston, Math
Brown, Helen, Buhl, Health	Eisenbarth, Barbara, Boise, Health
Brown, Kelli, Boise, Humanities	Erwin, Carolyn, Heyburn, Language Arts
Brown, Tom, Boise, Math	Esquibel, Gladys, Burley, Humanities
Browne, Teri, Moore, Science	Exline, Shawna, Boise, Language Arts
Brumbaugh, Velma, Bonners Ferry, Language Arts	Fallon, Jane, Moscow, Science
Bug-Townsend, Leah Idaho Falls, Science	Farley, Tom, Boise, Math
Burch, Teri, Coeur d'Alene, Social Studies	Farmin, Bonnie, Kellogg, all subjects

Fazio, Dawn, Moscow, Science
 Ferrell, Mary, Twin Falls, Health
 Fernandez-Aranguiz, Viola, Nampa, Humanities
 Feusahrens, Bill, Filer, Social Studies
 Fineman, Sue, Idaho Falls, Social Studies
 Finlay, Jennifer, Kellogg, Math
 Ford, Larry, Pocatello, Math
 Fox, Evin, Twin Falls, Math
 Fox, Linda, Moscow, Social Studies
 Francis, Jim, Idaho Falls, Social Studies
 Freiburger, Jane, Rupert, Language Arts
 Friday, Alberta, Fort Hall, Language Arts
 Galey, Laura, Lewiston, Language Arts
 Gambliel, Maria Carmen, Boise, Humanities
 Garner, Phyllis, Meridian, Social Studies
 Gates, George, Pocatello, Social Studies
 Geisler, Jennifer, St. Anthony, Science
 Gilchrist, Kaye, Boise, Humanities
 Girvan, James, Pocatello, Health
 Glennon, Karen, Boise, Language Arts
 Goeckner, Carol Rae, Wendell, Math
 Gonzalez, Hank, Pocatello, Language Arts
 Goodwin, Carl, Meridian, Humanities
 Goss, Jonathan, Bliss, Humanities
 Gould, Elizabeth, Boise, Humanities
 Grainger-Wilson, Helen, Pottlatch, Humanities
 Grunke, Judy, Weiser, Science
 Guerra, Andy, Pocatello, Social Studies
 Gunter, Jill, McCammon, Health
 Hagler, Geri, Coeur d'Alene, Science
 Hahn, Lucy, Boise, Math
 Hall, Kay, Post Falls, Social Studies
 Hallett, Marcia, Wendell, Health
 Hammond, Michelle, Caldwell, Science
 Hanlon, Heather, Boise, Humanities
 Hansen, Lance, Emmett, Math
 Hansen, Vaughn, Pocatello, Social Studies
 Hardenbrook, Jim, Caldwell, Social Studies
 Harman, Karla, Moscow, Health
 Harrington, Susan, Boise, Science and Math
 Harrington, Tom, Blackfoot, Humanities
 Harris, Matt, Coeur d'Alene, Humanities
 Hartley, Joyce, Boise, Social Studies
 Hartnett, Patti, Weiser, Science
 Harwood, M. Jan, Pocatello, Math
 Hasselquist, Claudia, Boise, Health
 Hatch, Karen, Burley, Humanities
 Hearn, Paula, Post Falls, Social Studies
 Heath, Jerry, Blackfoot, Humanities

Heaton, Debra, Lewiston, Social Studies
 Hemming, Iane, Rexburg, Language Arts
 Herron, Bruce, Boise, Science
 Hibbert, Pocatello, Language Arts
 Hill, Lynette, Boise, Language Arts
 Hininger, Jan, Nampa, Language Arts
 Hollifield, Carol, Hansen, Social Studies
 Homan, Scott, Nampa, Science
 Horn, Michael, Eagle, Science
 Hoy, Peggy, Twin Falls, Language Arts
 Hughbanks, Fineas, Gooding, Science
 Hughes, Ginny, Hayden Lake, Language Arts
 Hunt, Kathy, Boise, Social Studies
 Iverson, Edna, Sandpoint, Science
 Jackman, Teresa, Aberdeen, Social Studies
 Jakubowski, Joe, Caldwell, Health
 Jameson, Susan, Coeur d'Alene, Math
 Jansen, Marilyn, Wendell, Language Arts
 Jensen, Rosalie, Pocatello, Language Arts
 Johnson, Anne, Nampa, Language Arts
 Jones, Barbara, Burley, Social Studies
 Jones, Bertha, Idaho Falls, Humanities
 Jones, Dean, Boise, Math
 Jones, Peggy, Boise, Social Studies
 Jordan, Ken, Moscow, Social Studies
 Kelsey, Allen, Wendell, Social Studies
 Kennedy, Teresa, Moscow, Humanities
 Kerby, Connie, Weiser, Math
 Ketchum, Tracy, Osburn, Science
 Kidd, Kimberly, Rupert, Science
 Kinghorn, Cindy, Pocatello, Language Arts
 Knapp, Shannon, Preston, Social Studies
 Koehler, Grace, Wendell, Language Arts
 Koshuta, Vic, Garden Valley, Science
 Kreutzer, Natalie, Moscow, Humanities
 Krueger, Sonja, Boise, Science and Social Studies
 Kuntz, Kathy, Hayden Lake, Health
 Kuntz, Michael, Boise, Science
 Lagattuta, Nunzio, Emmett, Humanities
 Lane, Miffy, Pocatello, Language Arts
 Larracoechea, Sharon, Boise, Humanities
 Larsen, Nancy, Coeur d'Alene, Language Arts
 Lattimer, Penny, Lakefork, Science
 Lauer, Gary, Boise, Health and Humanities
 Laughlin, Desiree, Idaho Falls, Humanities
 Law, Mary Kay, Culdesac, Science
 Lenz, Greta, Ashton, Social Studies
 Lewis, Eleanor, Preston, Language Arts
 Lien, Keith, Jerome, Humanities

London, Jerri, Fairfield, Language Arts
 Luckey, Angela, Pocatello, Social Studies and Humanities
 Lusk, Katie, Aberdeen, Social Studies
 Lyons, Mike, Boise, Math
 Madden, Dano, Boise, Humanities
 Major, Kris, Boise, Social Studies
 Maloney, Catherine, Boise, Math
 Mann, Steven, Parma, Math
 Manor, Kathleen, Post Falls, Social Studies
 Mansell, Cathy, Boise, Humanities
 Marcellus, Ace, Twin Falls, Science
 Martin, Linda, Kellogg, Language Arts
 Martin, Marsha, Bovill, Health
 Mason, Debbie, Twin Falls, Social Studies
 Mather, Vicki, Smithfield, Math
 Mauer, Carolyn, Boise, Social Studies
 Maxey, Gale, Boise, Language Arts and Humanities
 Maxwell, Lori, Moscow, Math
 Mayton, Gary, Lewiston, Math
 McBurney, Constance, Blackfoot, Humanities
 McCaffee, Paige, Howe, Social Studies
 McCloskey, Richard, Boise, Science
 McCurdy, Donna, Arco, Social Studies
 McCurdy, Larue, Boise, Social Studies and Humanities
 McDonough, Kevin, American Falls, Math
 McDorman, Bill, Hailey, Humanities
 McMillan, Laurie, Burley, Math
 McMurtry, Jerry, Moscow, Humanities
 Mencke, Michelle, Wendell, Social Studies
 Mengal-Hoagland, Kari, Boise, Humanities
 Menta, Alene, Pocatello, Social Studies
 Merrick, Karlette, Bruneau, Health
 Millard, LaRae, Pocatello, Health
 Miller, Heidi, McCall, Humanities
 Miller, Howard, Dietrich, Humanities
 Miller, Melonie, St. Anthony, Social Studies
 Mills, Jim, Idaho Falls, Humanities
 Mills, Kimberly, Preston, Math
 Mink, Nicol, Weiser, Science
 Montgomery, Tina, Twin Falls, Math
 Moore, Cathy, McCall, Math
 Morgan, Jane, Hayden Lake, Humanities
 Moriarty, Katherine, Idaho Falls, Social Studies
 Morris, George, Weiser, Math
 Moss, Dew-Etta, Idaho Falls, Science
 Moyer, Laurie, Orofino, Social Studies
 Moyer, Linda, Fruitvale, Social Studies
 Mullen, Richard, Coeur d'Alene, Humanities
 Murphy, Michael, Boise, Social Studies
 Myers, Rita, Lewiston, Health
 Neely, Hilarie, Sun Valley, Humanities
 Nelson, Jennie, Moscow, Language Arts
 Neuhardt, Harry, Pocatello, Humanities
 Nida, Missy, Boise, Social Studies
 Nielson, Craig, Preston, Social Studies
 Odell, Michael, Moscow, Science
 Ohrtman, Dennis, Lewiston, Humanities
 Oldridge, Carol, Sagle, Health
 Olsen, Deanna, Post Falls, Health
 Olsen, Janice, Sugar City, Social Studies
 Olsen, Tricia, Meridian, Math
 O'Rorke, Barbara, Twin Falls, Language Arts
 Owens, Grace, Pocatello, Humanities
 Pack, Suzanne, Twin Falls, Math
 Packer, Patricia, Pocatello, Language Arts
 Paige, Michelle, Salmon, Humanities
 Parker, Rick, Twin Falls, Science
 Pavlock, Bob, Aberdeen, Health
 Pedersen, John, Nampa, Science
 Perry, Brent, Rupert, Math
 Perry, Patti, Coeur d'Alene, Language Arts
 Peters, Lynne, Coeur d'Alene, Language Arts
 Phelan, Kathy, McCall, Humanities
 Phillips, Jr., Rick, Pocatello, Science
 Piispanen, Ruth, Boise, Humanities
 Porter, Chris, Meridian, Health
 Post, Belva, Notus, Humanities
 Precht, Barbara, Meridian, Language Arts
 Prinzing, Dan, Boise, Humanities
 Proser, William, Coeur d'Alene, Language Arts
 Ramirez, Kelley, Twin Falls, Humanities
 Ranells, Mary Ann, Twin Falls, all subjects
 Reeves, Tera, Bovill, Math
 Richards, Doug, Potlatch, Humanities
 Ringe, Pat, Pocatello, Language Arts
 Rucker, Jack, Boise, Language Arts
 Ruff, Shelley, Post Falls, Social Studies
 Sanders, Decker, Mountain Home, Health
 Sanford, Dori, Arco, Social Studies
 Schreiner, Paula, Twin Falls, Language Arts
 Scott, Leah, Wendell, Language Arts
 Scott, Lynn, Boise, Social Studies
 Scully, Susan, Pocatello, Language Arts
 Seaman, Susan, Moscow, Language Arts
 Seibold, Kathy, Caldwell, Social Studies
 Serwat, David, Rathdrum, Social Studies
 Sharp, Peggy, Idaho Falls, Language Arts
 Silzly, Christine, Blackfoot, Social Studies

Simms, Robert, Boise, Social Studies
 Sinsley, Barb, Coeur d'Alene, Social Studies
 Smith, Cherry Mae, Burley, Language Arts
 Smith, Nancy, Nampa, Humanities
 Snouffer, Garnalee, Idaho Falls, Social Studies
 Sobotta, Jr., Bob, Lewiston, Health
 Soltman, Don, Rathdrum, Health
 Sorensen, Jeneane, Inkom, Health
 Spangler, Julie, Moscow, Language Arts
 Spear, Caile, Boise, Health
 Standley, Lois, Twin Falls, Math
 Stephensen, Mark, Eagle, Social Studies
 Stevenson, Nancy, Hayden Lake, Science
 Stivison, Erni, Boise, Math
 Stone, Sam, Caldwell, Humanities
 Suk, Anne, Nampa, Math
 Summers, Jack, Pocatello, Health
 Supulver, Lisa, Pinehurst, Language Arts
 Swanson, B.J., Moscow, Math
 Targee, Rosie, Boise, Social Studies
 Thomas, Mary, Boise, Health
 Thomason, Jackie, Meridian, Math
 Thompson, Wendy, Moscow, Social Studies
 Thomsen, Jan, Shoshone, Science
 Thorson, Steven, Jerome, Social Studies
 Tiede, Glen, Lewiston, Math
 Tominaga, JoAnn, Blackfoot, Humanities
 Toone, Sally, Gooding, Math
 Torfin, Glenda, Preston, Science
 Totorica, Ted, Boise, Humanities
 Trebby, Maria, Boise, Humanities
 Tyler, Susan, Aberdeen, Science
 Vance, Jean, McCall, Humanities
 Venditti, Phil, Lewiston, Math
 Verdall, Larry, Moscow, Math
 Votaw, Bonnie, Clarkston, Math
 Waddoups, Jerry, Preston, all subjects
 Walker, Diane, Moscow, Humanities
 Ware, Patricia, Boise, Science
 Warne, Bonnie, South Fremont, Humanities
 Wasia, Valerie, Blackfoot, Humanities
 Waters, Toni, Middleton, Health
 Weaver, Donna, Lewiston, Language Arts
 Weitz, Gerald, Moscow, health
 Wellsandt, Heather, Meridian, Language Arts
 Wenner, Peggy, Boise, Humanities
 Whipple, Susan, Boise, Humanities
 White, Pat, Boise, Science
 White, Scott, Pinehurst, Language Arts

Wieand, Gloria, Hailey, Social Studies
 Williams, Shelley, Eagle, Language Arts and Social Studies
 Winegar, Richard, Emmett, Humanities
 Winston, Jane, Idaho Falls, Humanities
 Winston, Mike, Shelley, Science
 Winters, Gloria, St. Anthony, Social Studies
 Womack, Elaine, Franklin, Math
 Worden, Gail, Post Falls, Math
 Wright, Linda, Cascade, Social Studies
 Yeoumans, Kris, Potlatch, Health
 Yost, Emilee, Pocatello, Language Arts
 Young, Robert, Pocatello, Science
 Zahm, Laurie, Pocatello, Health
 Zarybnisky, Mary, Burley, Social Studies
 Zook, Charles, Coeur d'Alene, Language Arts

TABLE OF CONTENTS - SCIENCE

526.	SCIENCE STANDARDS - GRADE KINDERGARTEN, SECTIONS 528 THROUGH 538.....	2
542.	SCIENCE STANDARDS - GRADE 1, SECTIONS 543 THROUGH 553.....	5
557.	SCIENCE STANDARDS - GRADE 2, SECTIONS 558 THROUGH 568.....	9
572.	SCIENCE STANDARDS - GRADE 3, SECTIONS 573 THROUGH 583.....	13
587.	SCIENCE STANDARDS - GRADE 4, SECTIONS 588 THROUGH 598.....	18
602.	SCIENCE STANDARDS - GRADE 5, SECTIONS 603 THROUGH 613.....	23
617.	SCIENCE STANDARDS - GRADE 6, SECTIONS 618 THROUGH 628.....	29
632.	SCIENCE STANDARDS - MIDDLE GRADES, (GRADES 7-8) SECTIONS 633 THROUGH 643.	34
647.	SCIENCE STANDARDS. – GRADES 9 THROUGH 12, SECTIONS 648 THROUGH 658.	42

526. SCIENCE STANDARDS - GRADE KINDERGARTEN, SECTIONS 528 THROUGH 538.

The samples associated with the content standards are meant to illustrate meaning and to represent possible areas of applications. They are not intended to be an exhaustive list, but are samples of applications that would demonstrate learning.

527. UNIFYING CONCEPTS OF SCIENCE.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand concepts and processes of evidence, models, and explanation.	a. Explore the concepts of observation and data collection.	i. Pumpkin exploration activities, including comparison. ii. Apple exploration activities, including comparison. iii. Weather observation, comparison, and data collection.
	b. Explore and use various models.	i. Globe. ii. Mouth model. iii. Centers (blocks, clay).
02. Understand constancy, change, and measurement.	a. Explore changes.	i. Illustrate the way individuals appeared as babies, kindergartners, and the way they think they will look as adults. ii. Cooking activities. iii. Color blending.
	b. Measure in non-standard units.	i. Measure objects in the classroom using: linking cubes, ribbons, string, one-inch cubes, and unit blocks. ii. Comparing height of other children to themselves.
03. Understand the theory that evolution is a process that relates to the gradual changes in the universe and of equilibrium as a physical state.	a. Understand the concepts of yesterday, today, and tomorrow.	i. Daily calendar activities. ii. Counting down to holidays or special events.

529. CONCEPTS OF SCIENTIFIC INQUIRY.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand scientific inquiry and develop critical thinking skills.	a. Make observations.	i. Weather observations. ii. Smother candle flame in a jar. iii. Describe classroom pets.
	b. Use various tools to gather information.	i. Use of magnifying glasses, tweezers, eyedroppers, and scale. ii. Use the five senses to gather information.
	c. Communicate observations.	i. Draw a picture of which objects sink and which objects float. ii. Dictate a passage to an adult to explain why a duck is a good swimmer.

530. CONCEPTS OF PHYSICAL SCIENCE.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the structure and function of matter and molecules and their interactions.	a. Use senses to explore and describe matter.	i. Mystery sack or surprise box to describe what is inside. ii. Closed-eye taste or smell test.

531. CELLULAR AND MOLECULAR CONCEPTS.

Cellular and Molecular Concepts standards do not apply at this grade level.

532. INTERDEPENDENCE OF ORGANISMS AND BIOLOGICAL CHANGE.

Standard – The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the theory of biological evolution.	a. Observe and explore the characteristics of plants and animals.	
	b. Sort animals into wild and domestic categories.	

533. MATTER, ENERGY, AND ORGANIZATION IN LIVING SYSTEMS.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the relationship between matter, energy, and organization to trace matter as it cycles and energy as it flows through living systems and between living systems and the environment.	a. Recognize the difference between living and non-living things.	i. Discover the needs of living things, such as food, water, air, and shelter. ii. Sort pictures of living and non-living items. iii. List difference of living and non-living items found in the classroom.

534. EARTH AND SPACE SYSTEMS.

Standard – The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand scientific theories of origin and subsequent changes in the universe and earth systems.	a. Observe and identify the four seasons.	i. Learn the terms fall, winter, spring, and summer. ii. Use appropriate colors to draw a picture of each season. iii. As a yearlong bulletin board display, dress a paper bear in clothing appropriate for daily weather.
	b. Observe different weather conditions.	i. As you are dressing your weather bear, discuss the different weather conditions.

535. TECHNOLOGY.

Standard – The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the relationship between science and technology and develop the abilities of technological design and application.	a. Distinguish between natural objects and objects made by humans.	i. Tree versus pencil. ii. Rock versus airplane.
	b. Recognize that people have invented tools for everyday life and for scientific investigations.	i. Classroom walk outside to find natural objects: classroom walk inside to find objects made by humans. ii. Use various writing tools (technological) and discuss their differences, (pencil, chalk, brush, charcoal, markers, mechanical pencil, and computer word processor).
	c. Create a tool to perform a specific function.	
	d. Use available and appropriate technology.	i. Computerized reading program or other computer learning aids.

536. PERSONAL AND SOCIAL PERSPECTIVES.

Standard – The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand common environmental quality issues, both natural and human induced.	a. Observe and discuss characteristics of the local environment.	i. Take a walk around the school and observe the physical characteristics of surrounding environment.
02. Understand the importance of natural resources and the need to manage and conserve them.	a. Understand the concept of recycling.	i. Collect aluminum cans and art scraps. ii. Visit a recycling plant.
	b. Discuss the conservation of natural resources.	i. Forests. ii. Water. iii. Use children's literature to illustrate concept.

537. HISTORY OF SCIENCE.

Standard – The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the significance of major scientific milestones.	a. Understand major contributions of various scientists and researchers.	

538. INTERDISCIPLINARY CONCEPTS.

Standard – The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand that interpersonal relationships are important in scientific endeavors.	a. Learn appropriate cooperation and interaction skills.	i. Provide opportunities and settings for the students to work together.
02. Understand technical communication.	a. Understand and follow instructions.	i. Follow a two-step direction. (Push in chair and line up.) ii. Place partners on opposite sides of a barrier. Have one partner build a train of linking cubes and verbally direct a partner to duplicate it.

539. -- 541. (RESERVED).**542. SCIENCE STANDARDS - GRADE 1, SECTIONS 543 THROUGH 553.**

The samples associated with the content standards are meant to illustrate meaning and to represent possible areas of applications. They are not intended to be an exhaustive list, but are samples of applications that would demonstrate learning.

543. UNIFYING CONCEPTS OF SCIENCE.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand concepts and processes of evidence, models, and explanation.	a. Explore the concepts of observation and data collection.	i. Daily weather graph. <ul style="list-style-type: none"> • Predict • Observe • Record ii. Observe metamorphosis of insects and record observations.
	b. Explore and use various models.	i. Use a plant model to locate major parts of a plant. ii. Use an animal model to locate major parts of an animal.
02. Understand constancy, change, and measurement.	a. Understand that changes occur and can be measured.	i. Measure a plant's growth daily and discuss its changes. ii. Observe the three states of matter (ice cube, water, water vapor). iii. Bake a cake and observe physical changes.
	b. Measure in both standard and non-standard units.	i. Measure your desk in inches and using hands. ii. Measure the room using the students' shoes. iii. Use a balance scale to weigh different objects. iv. Use a melting ice cube to measure time. v. Using different containers, find out how many scoops are needed to fill each container.

03. Understand the theory that evolution is a process that relates to the gradual changes in the universe and of equilibrium as a physical state.	a. Understand the concepts of past, present, and future.	i. Draw a picture of yourself as a baby, at the present, and how you will look at 100. (Good 100-day activity.) ii. What did the world look like when the dinosaurs were here? What does it look like now? What will it look like in 100 years?
04. Understand concepts of form and function.	a. Identify shape and use of objects.	i. Play an animal matching game. <ul style="list-style-type: none"> • Match mouths to diet • Match feet to habitat • Match body type to land, air, and water ii. Build a new animal. <ul style="list-style-type: none"> • Choose a head • Choose feet • Choose body iii. Put pieces together and name new animal. Describe where it might live and what it might eat. iv. "Project Learning Tree," Birds and Worms.

544. CONCEPTS OF SCIENTIFIC INQUIRY.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand scientific inquiry and develop critical thinking skills.	a. Brainstorm questions that can be investigated.	i. How does a flashlight work? ii. Why do leaves fall? iii. What will a magnet stick to? iv. Estimation activity.
	b. Make observations.	i. Discover what would happen to a seed that is planted under different conditions (without water, without light). ii. Use five senses to determine what is in a container.
	c. Use various tools to gather information.	i. Given an assortment of tools, students will choose the appropriate tool(s) to measure an object.
	d. Explore information and evidence.	i. Share ideas through class discussion. ii. Graph information to note change or compare and contrast.
	e. Use observations to make guesses.	i. Combine vinegar with another substance and predict what would happen (sugar, baking soda). Have class discussion. ii. Discriminate among flour, sugar, salt, baking powder, baking soda. iii. Use observations to make predictions about tomorrow's weather.
	f. Communicate observations.	i. Use logs, journals, pictures, and/or oral discussions to communicate observations.

545. CONCEPTS OF PHYSICAL SCIENCE.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the structure and function of matter and molecules and their interactions.	a. Know that objects have combinations of properties.	i. Mystery sack or surprise box to describe what is inside. ii. Describe smells from extracts placed in film canisters or balloons. iii. Hearing experiment.
	b. Recognize and classify matter as a solid, liquid, or gas.	i. Compare and contrast different items in classroom and outdoor environment. ii. Create "ooblick" using cornstarch and water. Discuss properties. iii. Using pictures create a collage of solids, liquids, and gases.
	c. Recognize that matter can change states (solid, liquid, gas).	i. Gelatin jigglers. ii. Ice cube, water, steam. iii. Tin-can ice cream.
02. Understand concepts of motion and forces.	a. Explore the position and motion of objects.	i. For instance, front, back, up, down, under, over, between, left, right, forward, backward, fast, slow.
	b. Explore different kinds of energy.	i. Solar cooking. ii. Wind mills. iii. Water wheels. iv. Use a pop bottle rocket filled with different levels of liquid to explore force.

546. CELLULAR AND MOLECULAR CONCEPTS.

Cellular and Molecular Concepts standards do not apply at this grade level.

547. INTERDEPENDENCE OF ORGANISMS AND BIOLOGICAL CHANGE.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the theory of biological evolution.	a. Observe and explore the life cycles of plants and animals and their basic needs.	i. Using literature, learn about different animals that have adapted such as the Arctic Fox, animals on the Galapagos Islands, and the snowshoe hare. ii. Using videos learn about different plant and animal adaptations.
	b. Recognize that animals live in different habitats for which they are suited.	i. Use magazine pictures to graph appropriate and inappropriate habitats. ii. Group pictures of animals in their environment/land, air, and water.

548. MATTER, ENERGY, AND ORGANIZATION IN LIVING SYSTEMS.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the relationship between matter, energy, and organization to trace matter as it cycles and energy as it flows through living systems and between living systems and the environment.	a. Understand that living things need food to survive.	i. Learn about different systems that keep a tree alive ("Project Learning Tree," Tree Factory). ii. Identify the components of a habitat and the basic need for them ("Project Wild," Habitat Lap Sit Activity). iii. Care for a classroom pet. iv. Choose an animal and create a diorama or mobile of that animal in their habitat keeping in mind their needs.

549. EARTH AND SPACE SYSTEMS.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand scientific theories of origin and subsequent changes in the universe and earth systems.	a. Identify the four seasons and their characteristics.	i. Study the cycle of a tree through the four seasons. ii. Draw a picture of a tree depicting its appearance through all four seasons. iii. As a yearlong bulletin board display, decorate a deciduous tree according to the season.
	b. Understand the characteristics of different weather conditions.	i. As you are graphing your weather, discuss the different characteristics of the weather.

550. TECHNOLOGY.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the relationship between science and technology and develop the abilities of technological design and application.	a. Distinguish between natural objects and objects made by humans.	i. Tree versus pencil.
	b. Recognize that people have invented tools for everyday life and for scientific investigations.	i. Pose a situation and discuss what tools would be needed. ii. Use and experience tools.
	c. Create a tool to perform a specific function.	
	d. Use available and appropriate technology.	i. Use computers and calculators.

551. PERSONAL AND SOCIAL PERSPECTIVES.

Standards - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand common environmental quality issues, both natural and human induced.	a. Identify the characteristics of the local environment.	i. Take a walk outside and observe the physical characteristics of surrounding environment. ii. Draw picture of observation. iii. Construct a class model using different materials.
02. Understand the importance of natural resources and the need to manage and conserve them.	a. Understand the concept of recycling.	i. Participate in a recycling program. ii. Create a recycled art project. iii. Create a compost tub using worms. iv. Bury garbage that includes organic and inorganic materials. Dig up and check weekly.
	b. Understand the conservation of natural resources.	i. Plant trees. ii. Make posters to remind people to conserve the natural resources. iii. Use literature (<u>The Lorax</u> , <u>The Great Kapok Tree</u> , <u>Just a Dream</u>).

552. HISTORY OF SCIENCE.

Standards - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the significance of major scientific milestones.	a. Understand major contributions of various scientists and researchers.	

553. INTERDISCIPLINARY CONCEPTS.

Standards - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand that interpersonal relationships are important in scientific endeavors.	a. Learn appropriate cooperation and interaction skills.	i. Divide puzzle pieces into four envelopes. Give each member of a four-person team an envelope. The team then assembles a puzzle.
02. Understand technical communication.	a. Understand and follow instructions.	i. Use pattern blocks. Let students verbally direct each other to duplicate the design. Place students back to back. ii. Use a listening page.

554. -- 556. (RESERVED).**557. SCIENCE STANDARDS - GRADE 2, SECTIONS 558 THROUGH 568.**

The samples associated with the content standards are meant to illustrate meaning and to represent possible areas of applications. They are not intended to be an exhaustive list, but are samples of applications that would demonstrate learning.

558. UNIFYING CONCEPTS OF SCIENCE.

Standards - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand concepts and processes of evidence, models, and explanation.	a. Explore the concepts of observation and data collection.	i. Observe the development of a caterpillar, keep journal, make predictions, and record findings.
	b. Explore and use various models.	i. Water cycle. ii. Food pyramid. iii. Habitats. iv. Connecting blocks.
02. Understand constancy, change, and measurement.	a. Understand that changes occur and can be measured.	
	b. Measure in standard and non-standard systems.	i. Student's growth log. ii. Keep plant journal. iii. Pilgrim House (make a life-size model using masking tape to outline house dimensions and interior furnishings).
03. Understand the theory that evolution is a process that relates to the gradual changes in the universe and of equilibrium as a physical state.	a. Understand the concepts of past, present, and future.	i. Timeline (family tree, personal history). ii. "What if" discussions: technology/inventions; what if electricity had not been discovered? iii. Plant experiments (monitor changes under different conditions [dark, under watered, over watered, no soil]). iv. Compare the changes in the food preservation process throughout history.
04. Understand concepts of form and function.	a. Identify shape and use of objects.	i. Research birds to learn why they have different beaks or feet. ii. Write a story about why animals have certain characteristics (webbed feet, flat tails, claws, fangs).

559. CONCEPTS OF SCIENTIFIC INQUIRY.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand scientific inquiry and develop critical thinking skills.	a. Brainstorm questions that can be investigated.	i. Scientific experiments that stimulate students to ask questions such as: <ul style="list-style-type: none"> • Grow mold under different conditions • Magnetism with various materials • Carnation with split stem in colored water
	b. Make observations.	i. Germs in a covered petri dish. ii. Alka-Seltzer rockets.
	c. Use various tools to gather information.	i. Given an assortment of tools, students will choose the appropriate tool(s) to measure and weigh an object and record data.
	d. Explore information and evidence.	i. Analyze data by: <ul style="list-style-type: none"> • Graphing • Class discussion

	e. Use observations to make guesses.	i. Present data. ii. Compare results.
	f. Communicate observations.	i. Explain why the tool chosen was the most appropriate one.

560. CONCEPTS OF PHYSICAL SCIENCE.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the structure and functions of matter and molecules and their interactions.	a. Know that objects have combinations of properties.	i. Identify objects and two or more of their properties (color, harness, size, shape, texture, smell).
	b. Recognize and classify matter as a solid, liquid, or gas.	i. In small cooperative teams have students identify various examples of each state of matter.
	c. Recognize that matter can change states (solid, liquid, gas).	i. Melting/hardening chocolate. ii. Raw versus boiled egg.
02. Understand concepts of motion and forces.	a. Explore the position and motion of objects.	
	b. Explore different kinds of energy.	

561. CELLULAR AND MOLECULAR CONCEPTS.

Cellular and Molecular Concepts standards do not apply at this grade level.

562. INTERDEPENDENCE OF ORGANISMS AND BIOLOGICAL CHANGE.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the theory of biological evolution.	a. Observe and explore the life cycles of plants and animals and their basic needs.	i. Plant a seed and monitor its growth. ii. Hatch an egg. iii. Observe a caterpillar as it forms a cocoon. iv. Observe tadpoles in an aquarium over time. v. Classroom animal visits.
	b. Recognize that animals live in different habitats for which they are suited.	i. Take a field trip to a nature conservancy or a zoo. ii. Watch videos and discuss different habitats. iii. Create a habitat in your classroom by adding animals that would live there. Observe different habitats (ant farm, aquarium, beehive).

563. MATTER, ENERGY, AND ORGANIZATION IN LIVING SYSTEMS.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the relationship between matter, energy, and organization to trace matter as it cycles and energy as it flows through living systems and between living systems and the environment.	a. Understand that living things need food to survive.	i. Classroom pet. ii. Food pyramid.

564. EARTH AND SPACE SYSTEMS.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand scientific theories of origin and subsequent changes in the universe and earth systems.	a. Identify the four seasons and their characteristics.	i. Study the cycle of a tree through the four seasons. ii. Draw a picture of a tree depicting its appearance through all four seasons. iii. As a yearlong bulletin board display, decorate a deciduous tree according to the season.
	b. Understand the characteristics of different weather conditions.	
02. Understand geo-chemical cycles and energy in the earth system.	a. Explore evaporation and precipitation.	i. Using a wet paper towel, wipe a chalkboard or desk and determine where the water goes. ii. Hang wet paper towel to dry. Discuss observations. iii. Go outside in the rain and discuss where rain comes from.

565. TECHNOLOGY.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the relationship between science and technology and develop the abilities of technological design and application.	a. Distinguish between natural objects and objects made by humans.	i. Tree versus pencil.
	b. Recognize that people have invented tools for everyday life and for scientific investigations.	i. Do an activity with and without a tool and determine which task was easier. ii. Invent a tool to complete a task.
	c. Create a tool to perform a specific function.	
	d. Use available and appropriate technology.	i. Use the Internet as a research source. ii. Use a microscope and magnifying glass to see more detail than the human eye can provide.

566. PERSONAL AND SOCIAL PERSPECTIVES.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand common environmental quality issues, both natural and human induced.	a. Identify the characteristics of the local environment.	i. Make a map of the school, town, etc. ii. Make a model of the town out of milk cartons and cereal boxes.
02. Understand the importance of natural resources and the need to manage and conserve them.	a. Understand the concept of recycling.	i. Start a classroom/school-recycling program. ii. Field trip to a recycling center. iii. Make your own recycled paper.
	b. Understand the conservation of natural resources.	i. Guest speakers from various natural resource and conservation professions. ii. Measure classroom and home resource use (how much water to wash hands, brush teeth, drinking).

567. HISTORY OF SCIENCE.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the significance of major scientific milestones.	a. Understand major contributions of various scientists and researchers.	

568. INTERDISCIPLINARY CONCEPTS.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand that interpersonal relationships are important in scientific endeavors.	a. Learn appropriate cooperation and interaction skills.	i. Group activities where each student is given a particular task.
02. Understand technical communication.	a. Understand and follow instructions.	i. "Telephone game" variation - students in groups. One member of each group receives an instruction to relate to the rest of the group. When the group is finished with that instruction, the next member receives another instruction.

569. -- 571. (RESERVED).**572. SCIENCE STANDARDS - GRADE 3, SECTIONS 573 THROUGH 583.**

The samples associated with the content standards are meant to illustrate meaning and to represent possible areas of applications. They are not intended to be an exhaustive list, but are samples of applications that would demonstrate learning.

573. UNIFYING CONCEPTS OF SCIENCE.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand systems, order, and organization.	a. Recognize that a system is an organized group of related objects that form a whole.	i. Show how animals and plants rely on one another for oxygen/carbon dioxide. ii. Act out how the particular system works. iii. Sample systems: water cycle, toy car or truck.
	b. Explore the solar system.	
02. Understand concepts and processes of evidence, models, and explanation.	a. Develop skills in observation and data collection.	i. Adopt-A-Tree: predict, observe, and record changes throughout the year. ii. Any simple experiment that will allow changes in variables (bread mold, Alka-Seltzer rocket, petri dish).
	b. Recognize the difference between observations and inferences.	
	c. Develop and/or use models to explain how things work.	i. Make a model of the solar system. ii. Make a model bridge and test how much weight it can support.
03. Understand constancy, change, and measurement.	a. Explore concepts in science that do not change with time.	
	b. Understand that changes occur and can be measured.	i. Track the sun. Measure or trace shadows throughout the day. ii. Plant a seed and measure its daily growth. iii. Record and predict the daily temperature.
	c. Measure in both the standard and metric systems.	i. Measure temperature in Fahrenheit and Celsius. ii. Measure classroom items (perimeter and area).
04. Understand the theory that evolution is a process that relates to the gradual changes in the universe and of equilibrium as a physical state.	a. Understand the relationships of past, present, and future.	i. Water cycle. ii. Rocks. iii. Fossils.
05. Understand concepts of form and function.	a. Discover the relationship between shape and use.	i. Create a creature to survive in a particular environment/habitat.

574. CONCEPTS OF SCIENTIFIC INQUIRY.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand scientific inquiry and develop critical thinking skills.	a. Identify questions that can be answered by conducting scientific tests.	i. Use scientific experiments that stimulate students to ask questions, for example, building structures (tower).

	b. Conduct scientific tests.	i. Build a tower with toothpicks and marshmallows to see how high it can be built. ii. Build a structure using blocks to test structural strength.
	c. Use appropriate tools and techniques to gather and display data.	i. Given an assortment of tools, students will choose the appropriate tool(s) to measure and weigh an object and record data.
	d. Use data to construct a reasonable explanation.	i. Analyze data by: • graphing • class discussion
	e. Make simple predictions based on data.	i. Explain why the chosen structure design was the most appropriate one.
	f. Explore alternative explanations.	i. Discuss alternate methods and designs that could be used to achieve more successful results.
	g. Communicate the results of tests to others.	i. Share design with the class. ii. Compare results. iii. Use design and results in a science fair.

575. CONCEPTS OF PHYSICAL SCIENCE.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the structure and function of matter and molecules and their interactions.	a. Use simple instruments to measure properties.	
	b. Explore the properties of solids, liquids, and gases.	i. Freeze water, melt the ice, and then boil the water. ii. Raisins in carbonated water/soda (submarines). iii. Baking soda and vinegar in bottle with expanding balloon.
	c. Know that heating and cooling can cause changes of state in common materials.	i. Grow crystals. ii. Boil an egg. iii. Melt chocolate. iv. Conglomerate cooking (pancakes with chocolate chips).
02. Understand concepts of motion and forces.	a. Investigate the effect of pull/push on the motion and direction of objects.	
	b. Recognize different forms of energy.	

	c. Explore and investigate the six simple machines: demonstrate that the six simple machines can decrease the amount of force necessary to complete a task.	i. Use simple machines to do work and determine which machine is more appropriate for each task. ii. Complete class experiments using pulleys, leavers and fulcrums, incline planes, wheels, gears, and screws.
03. Understand the total energy in the universe is constant.	a. Compare and contrast potential and kinetic energy.	

576. CELLULAR AND MOLECULAR CONCEPTS.

Cellular and Molecular Concepts standards do not apply at this grade level.

577. INTERDEPENDENCE OF ORGANISMS AND BIOLOGICAL CHANGE.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the theory of biological evolution.	a. Investigate diversity of plants and animals and how they adapt in order to survive in their environment.	
	b. Investigate how plants and animals become extinct if their adaptations do not fit their environment.	
	c. Recognize the difference between vertebrate and invertebrate animals: classify vertebrate animals (mammals, reptiles, birds, fish, amphibians).	i. Picture collages. ii. Class art display representing animal classes.

578. MATTER, ENERGY, AND ORGANIZATION IN LIVING SYSTEMS.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the relationship between matter, energy, and organization to trace matter as it cycles and energy as it flows through living systems and between living systems and the environment.	a. Know that living systems require energy to survive.	i. Classroom pets. ii. Plant experiment (fertilized, not fertilized, watered, not watered). iii. See "Project Wild," "Project Wet," and "Project Learning Tree" activities.
	b. Understand the food chain and know that organisms both cooperate and compete in ecosystems.	

579. EARTH AND SPACE SYSTEMS.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand scientific theories of origin and subsequent changes in the universe and earth systems.	a. Explore the length of a day, the seasons, the year, phases of the moon, and eclipses.	
	b. Compare and contrast the contents of the solar system.	i. Make a model of the solar system. ii. Use the Internet to view images from Mars's probes.
	c. Explore the effect of gravity on the solar system; include elements within the solar system such as the Earth, Moon and tides.	

580. TECHNOLOGY.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the relationship between science and technology and develop the abilities of technological design and application.	a. Know that technology is the means by which people use knowledge, tools, and systems to make their lives easier and better.	i. Explore the history of the microscope, telescope, telephone, computer, and how advances in technology has improved the device. ii. Tree versus pencil.
	b. Recognize that people have invented tools for everyday life and for scientific investigations.	i. Choose an invention, write about the inventor, and describe any advances that have improved the invention and everyday life.
	c. Create a tool to perform a specific function.	
	d. Use available and appropriate technology.	

581. PERSONAL AND SOCIAL PERSPECTIVES.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand common environmental quality issues, both natural and human induced.	a. Identify issues in the local environment.	i. Collect newspaper and magazine articles. ii. Make a current issue's bulletin board. iii. Discuss issues and possible solutions. iv. Write a letter to government representatives or the newspaper.
02. Understand the causes and effects of population change.	a. Understand the effect of technological development and human population growth on local towns and/or Idaho.	

03. Understand the importance of natural resources and the need to manage and conserve them.	a. Understand the concept of recycling.	i. Participate in a recycling program. ii. Field trip to a recycling center. iii. Make your own recycled paper. iv. Build a compost pile. v. Make things (planters, bird feeders, mobiles, toys) using recyclable materials.
	b. Understand the conservation of natural resources.	i. Measure classroom and home resource use (how much water to wash hands, brush teeth, drinking). ii. Guest speakers from various natural resource and conservation professions. iii. Write a story about what might happen if natural resources ran out. iv. Collect uneaten food for a day/week and measure its weight.
04. Understand different uses of technology in science and how they affect our standard of living.	a. Identify examples of technologies used in scientific fields.	i. Brainstorm what technologies are used in a particular field (doctor, policeman, dentist, scientist, weatherman, astronaut). ii. Guest speaker from (03.b.) above to describe technology used. Compare brainstorm results with actual technology used.

582. HISTORY OF SCIENCE.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the significance of major scientific milestones.	a. Understand major contributions of various scientists and researchers.	

583. INTERDISCIPLINARY CONCEPTS.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand that interpersonal relationships are important in scientific endeavors.	a. Work in teams to solve problems.	i. Give a task to perform individually and as a group (putting up a tent, building a model, completing a puzzle).
02. Understand technical communication.	a. Read and understand instructions.	i. Give students a simple recipe to follow and compare results.

584. -- 586. (RESERVED).

587. SCIENCE STANDARDS - GRADE 4, SECTIONS 588 THROUGH 598.

The samples associated with the content standards are meant to illustrate meaning and to represent possible areas of applications. They are not intended to be an exhaustive list, but are samples of applications that would demonstrate learning.

588. UNIFYING CONCEPTS OF SCIENCE.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand systems, order, and organization.	a. Recognize that a system is an organized group of related objects that form a whole.	i. Create a model of a system using existing curriculum (electricity, space, food chain, rock cycle).
	b. Explore the solar system.	
02. Understand concepts and processes of evidence, models, and explanation.	a. Develop skills in observation and data collection.	i. Collect and classify samples of igneous, sedimentary, and metamorphic rocks. ii. Observe and draw the phases and positions of the moon over a period of time.
	b. Recognize the difference between observations and inferences.	
	c. Develop and/or use models to explain how things work.	i. Create a solar system model and explain moon phases (eclipses, orbits). ii. Create a model of a system using existing curriculum (electricity, space, food chain, rock cycle).
03. Understand constancy, change, and measurement.	a. Explore concepts in science that do not change with time.	i. Show that the boiling point is always the same temperature (depending upon elevation). ii. Discover at what temperature water freezes.
	b. Understand that changes occur and can be measured.	
	c. Measure using standard and metric systems.	i. Measure the length of another person's shadow at morning, noon, and afternoon.
04. Understand the theory that evolution is a process that relates to the gradual changes in the universe and of equilibrium as a physical state.	a. Understand the relationships of past, present, and future.	i. Diagram the rock cycle. ii. Create a timeline of our solar system and predict possible what it might occur in the future
05. Understand concepts of form and function.	a. Discover the relationship between shape and use.	i. Investigate Native American tools and why they were developed that way. ii. Improvement of shape and use in technology (microscope, telescope). iii. Investigate how technology has been used to improve the shape and function of items such as cars, scientific equipment, etc.

589. CONCEPTS OF SCIENTIFIC INQUIRY.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand scientific inquiry and develop critical thinking skills.	a. Identify questions that can be answered by conducting scientific tests.	i. What type of cup keeps water cooler? ii. Hypothesize which cup will stay cooler and why.
	b. Conduct scientific tests.	i. Conduct an experiment using paper, plastic, glass, and Styrofoam, as insulators.
	c. Use appropriate tools and techniques to gather and display data.	i. Graph class results using temperature data. ii. Use a calculator to determine averages of data.
	d. Use data to construct a reasonable explanation.	i. Develop an explanation why one cup's content stays cooler or warmer than the other does.
	e. Make simple predictions based on data.	i. Draw conclusions for cup usage for lemonade or hot chocolate.
	f. Explore alternative explanations.	i. Analyze and compare the properties and designs of the cups. ii. Discuss and recognize other possible variables.
	g. Communicate the results of tests to others.	i. Present data to an audience in a meaningful way.

590. CONCEPTS OF PHYSICAL SCIENCE.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the structure and function of matter and molecules and their interactions.	a. Use simple instruments to measure properties.	i. Measure dimensions in metric and standard. ii. Measure temperatures Fahrenheit and Celsius.
	b. Explore the properties of solids, liquids, and gases.	i. Investigate the properties of ooblick. ii. Present a solid, a liquid, and a gas using an ice cube.
	c. Know that heating and cooling can cause changes of state in common materials.	i. Draw a picture of the water/rock cycle and label where the physical changes are occurring. Describe why this is a physical change.
02. Understand concepts of motion and forces.	a. Investigate the effect of pull/push on the motion and direction of objects.	i. Activities to demonstrate Newton's Laws.
	b. Research different forms of energy.	i. Use different materials to insulate an ice cube and determine which works best. ii. Place a drop of food coloring in both hot and cold water and compare results.

	c. Explore and investigate the six simple machines: demonstrate that the six simple machines can decrease the amount of force necessary to complete a task.	i. Complete class experiments using pulleys, levers and fulcrums, inclined planes, wheels and gears and screws.
03. Understand the total energy in the universe is constant.	a. Compare and contrast potential and kinetic energy.	

591. CELLULAR AND MOLECULAR CONCEPTS.

Cellular and Molecular Concepts standards do not apply at this grade level.

592. INTERDEPENDENCE OF ORGANISMS AND BIOLOGICAL CHANGE.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the theory of biological evolution.	a. Investigate diversity of plants and animals and how they adapt in order to survive in their environment.	i. Compare and contrast the life cycles of grasshoppers, frogs, butterflies, and humans. ii. Refer to "Project Wild," "Project Wet," "Project Learning Tree" activities.
	b. Investigate how plants and animals become extinct if their adaptations do not fit their environment.	
	c. Recognize the difference between vertebrate and invertebrate animals: classify vertebrate animals (mammals, reptiles, birds, fish, amphibians).	

593. MATTER, ENERGY, AND ORGANIZATION IN LIVING SYSTEMS.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the relationship between matter, energy, and organization to trace matter as it cycles and energy as it flows through living systems and between living systems and the environment.	a. Know that living systems require energy to survive.	i. Using geraniums cover some leaves using plastic wrap and aluminum foil. Observe changes in the leaves.
	b. Understand the food chain and know that organisms both cooperate and compete in ecosystems.	i. Create a food web using a ball of string passed from student to student. Remove the plant life. Observe the effects on the rest of the web.

594. EARTH AND SPACE SYSTEMS.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand scientific theories of origin and subsequent changes in the universe and earth systems.	a. Explore the length of a day, the seasons, the year, phases of the moon, and eclipses.	i. Once a week, record the length of a day throughout the school year. ii. Measure the length of a human shadow at noon in October, January, and May. iii. Model an eclipse using paper circles and a flashlight.
	b. Compare and contrast the contents of the solar system.	
	c. Explore the effect of gravity on the solar system; include elements within the solar system such as the Earth, Moon, and tides.	

595. TECHNOLOGY.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the relationship between science and technology and develop the abilities of technological design and application.	a. Know that technology is a means by which people use knowledge, tools, and systems to make their lives easier and better.	i. Make a poster showing one-way technology makes your life easier (outhouse versus toilet).
	b. Recognize that people have invented tools for everyday life and for scientific investigations.	i. Collect pictures of tools that are in your home. Explain how these tools make everyday life easier.
	c. Create a tool to perform a specific solution.	
	d. Use available and appropriate technology.	

596. PERSONAL AND SOCIAL PERSPECTIVES.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand common environmental quality issues, both natural and human induced.	a. Identify issues in the local environment.	i. Compile a case study of a local environmental issue and describe its impact on Idaho's economy. <ul style="list-style-type: none"> • Water quality • Air quality • Hazardous waste • Forest health
02. Understand the causes and effects of population change.	a. Understand the effect of technological development and human population growth on local towns and/or Idaho.	i. Compare and contrast pictures of your city today and ten years ago. ii. Compare and contrast the differences between a small town and a larger town in Idaho.

03. Understand the importance of natural resources and the need to manage and conserve them.	a. Understand the concept of recycling.	i. Collect trash and divide into renewable and nonrenewable resources. ii. Participate in a recycling program. iii. Field trip to a recycling center. iv. Make your own recycled paper. v. Build a compost pile. vi. Make things (planters, bird feeders, mobiles, toys) using recyclable materials.
	b. Understand the conservation of natural resources.	i. Compare and contrast the different forms of transportation and their impact on natural resources (public transportation, automobiles, bicycles).
04. Understand different uses of technology in science and how they affect our standard of living.	a. Identify examples of technologies used in scientific fields.	i. Food production. ii. Environmental cleanup. iii. Advances in medicine. iv. Communications. v. The space program. vi. Weather forecasting.

597. HISTORY OF SCIENCE.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the significance of major scientific milestones.	a. Understand major contributions of various scientists and researchers.	i. Choose a scientist from a topic studied this year and explain how their contribution was significant to society.

598. INTERDISCIPLINARY CONCEPTS.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand that interpersonal relationships are important in scientific endeavors.	a. Work in teams to solve problems.	i. Compare and contrast the difficulties of solving a problem alone or in teams. ii. Given a triangular puzzle, work in teams to solve. Discuss the results.
02. Understand technical communication.	a. Read and understand instructions.	i. Build a model using written instructions.

599. -- 601. (RESERVED).

602. SCIENCE STANDARDS - GRADE 5, SECTIONS 603 THROUGH 613.

The samples associated with the content standards are meant to illustrate meaning and to represent possible areas of applications. They are not intended to be an exhaustive list, but are samples of applications that would demonstrate learning.

603. UNIFYING CONCEPTS OF SCIENCE.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand systems, order, and organization.	a. Know that a system is an organized group of related objects that form a whole.	i. Using a clear plastic container, create a biome using soil, plants, and earthworms.
	b. Describe the function of each human body system.	i. Diagram the respiratory system. ii. Sample systems: muscular, digestive, circulatory, weather, bicycle, etc.

02. Understand concepts and processes of evidence, models, and explanation.	a. Know that observations and data are evidence on which to base scientific explanations and predictions.	i. Compare biomes with different variables such as light, temperature, water. ii. Compare and graph a resting heart rate against a heart rate after exercise.
	b. Know the difference between observations and inferences.	i. Use happy/sad balls to determine the differences between observation and inference. ii. During a science experiment, discuss the difference between observation and inference.
	c. Use models to explain or demonstrate a concept.	i. Create a balloon model using a plastic cup, straw, fastener, and balloons and explain the respiratory system.
	d. Develop skills to create scientific explanations based on scientific knowledge, logic, and analysis.	
03. Understand constancy, change, and measurement.	a. Recognize that some concepts in science do not change with time.	i. Create a straight track with a steady decline, marking the midpoint. Roll a marble and measure the speed from the beginning to the midpoint and midpoint to the end. Compare acceleration rates.
	b. Analyze changes that occur in and among systems.	i. Create a system of ice water. Measure the temperature. Add a variable such as rock salt and compare the temperatures. ii. Measure the temperature of water in different colored containers over time.
	c. Measure using standard and metric systems with an emphasis on the metric system.	i. Measure various objects (temperature, volume, weight, length) using both metric and customary systems.
04. Understand the theory that evolution is a process that relates to the gradual changes in the universe and of equilibrium as a physical state.	a. Understand the relationships of past, present, and future.	i. Create and demonstrate an erosion model with sand, gravel, humus, and dirt before and after addition of vegetation and other soil components.
05. Understand concepts of form and function.	a. Understand that the shape or form of an object or system is frequently related to its use or function.	i. Study the form and function of bicycles or clocks.

604. CONCEPTS OF SCIENTIFIC INQUIRY.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand scientific inquiry and develop critical thinking skills.	a. Develop questions that can be answered by conducting scientific experiments.	i. How does the length of plastic straw kazoo affect pitch? Hypothesize.

	b. Conduct scientific investigations using controls and variables when appropriate.	i. Build a straw kazoo by flattening one end and cutting it into to a v-shape. ii. Conduct an experiment to test several different lengths of kazooos.
	c. Select and use appropriate tools and techniques to gather and display data.	i. Measure and record lengths of kazooos. ii. Make a human graph in order of the lengths of the kazooos. Verify that pitch differences are consistent with the lengths. iii. Tape kazooos in order of length to create three-dimensional graph representing relationship to pitch.
	d. Analyze data in order to develop descriptions, explanations, predictions, and models using evidence.	i. Develop an explanation why straw length determines the pitch.
	e. Develop a hypothesis based on observations.	i. Draw conclusions from individual or class data.
	f. Compare alternative explanations and predictions.	i. Discuss and recognize other possible variables.
	g. Communicate scientific procedures and explanations.	i. Have class present data to a music teacher in written or oral form. Present data to the class in a meaningful way.

605. CONCEPTS OF PHYSICAL SCIENCE.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the structure and function of matter and molecules and their interactions.	a. Explore and describe the differences among elements, compounds, and mixtures.	i. Provide samples of different elements (lead, carbon, sodium, chlorine) for student observation. ii. Show different types of compounds (sodium chloride, water) and describe physical differences. iii. Have students create their own mixtures.
	b. Explore and calculate properties of matter.	i. Determine the density of several objects.
	c. Compare differences among solids, liquids, and gases using the concept of density: explore the effect of temperature on density.	i. Present three liquids, three solids, and three gases and compare properties.
	d. Understand the nature of physical change and how it relates to physical properties.	i. Discuss properties of butter. Change the butter by cutting and then heating. Observe properties at each state.
02. Understand chemical reactions.	a. Observe and know that substances react with each other to form new substances with different properties.	i. Baking soda and vinegar in bottle with expanding balloon activity.

03. Understand concepts of motion and forces.	a. Observe the effects of different forces (gravity and friction) on the movement, speed, and direction of an object.	i. Using a variety of inclined planes and surfaces, determine the speed of several objects and graph the results.
	b. Investigate different forms of energy.	i. Make an electromagnet.

606. CELLULAR AND MOLECULAR CONCEPTS.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the cell is the basis of form and function for all living things and how living things carry out their life functions.	a. Explore the different structural levels of which an organism is comprised: cells, tissues, organs, organ systems, and organisms.	i. Observe objects under a microscope such as onion skin or cheek scrapings.
	b. Recognize the structural differences between plant and animal cells.	i. Diagram a plant and animal cell and label. ii. Create a Venn diagram that shows the similarities and differences.
	c. Explore the concept that traits are passed from parents to offspring.	i. Collect and graph eye color data of family members and compare with own and graph.

607. INTERDEPENDENCE OF ORGANISMS AND BIOLOGICAL CHANGE.

Interdependence of Organisms and Biological Change standards do not apply at this grade level.

608. MATTER, ENERGY, AND ORGANIZATION IN LIVING SYSTEMS.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the relationship between matter, energy, and organization to trace matter as it cycles and energy as it flows through living systems and between living systems and the environment.	a. Know that the energy for life is primarily derived from the sun through photosynthesis.	i. Plant grass in small container. Put some grass in the dark and some in the sunlight. Compare results.

609. EARTH AND SPACE SYSTEMS.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand scientific theories of origin and subsequent changes in the universe and earth systems.	a. Investigate the interactions between the solid earth, oceans, atmosphere, and organisms.	i. Research topics: pollution, oceans affect on climate, global warming, weather, plate tectonics or continental drift.
	b. Know the water cycle and its relationship to weather and climate.	

	c. Identify cumulus, cirrus, and stratus clouds and their relationship to weather changes.	
	d. Know that fossils are evidence of past life forms.	i. Make a fossil out of Plaster of Paris. ii. Given a fossil, create a story about how it came to be (leaf, dinosaur bone, sea shells). iii. Field trip to a fossil bed or museum (Hagerman).
02. Understand geo-chemical cycles and energy in the earth system.	a. Know the rock cycle and identify the three classifications of rocks.	i. Create an informational book explaining the rock cycle.
	b. Know the layers and composition of the earth.	

610. TECHNOLOGY.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the relationship between science and technology and develop the abilities of technological design and application.	a. Know that science and technology are human endeavors interrelated to each other, to society, and to the work place.	i. Interview a professional such as a doctor, a farm mechanic, or computer tech and ask them to explain how they use science and technology in their field.
	b. Compare scientific inquiry and technological design in terms of activities, results, and influences on individuals and society: know that science enables technology and vice versa.	i. Identify modifications of an everyday object (car, toothbrush, tennis shoe) and explain how science has aided in its evolution.
	c. Create a tool to perform a specific function.	
	d. Use available and appropriate technology.	
	e. Explore the elements of technological design, which include the following: <ul style="list-style-type: none"> - Identify a problem; - Propose a solution; - Implement a proposed solution; - Evaluate the solution and its consequences; - Communicate the problem, process, and solution. 	i. Using a mousetrap, design a contraption that will extinguish a candle from 10 feet away.

611. PERSONAL AND SOCIAL PERSPECTIVES.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand common environmental quality issues, both natural and human induced.	a. Identify issues for environmental studies.	i. Research an environmental issue and describe its impact on the United States.
02. Understand the causes and effects of population change.	a. Understand the effect of technological development and human population growth on the United States and/or the world.	i. Compare and contrast pictures of your city today and ten years ago. ii. Compare and contrast the differences in the United States. iii. Take a field trip to the local sewage treatment center or water treatment plant. iv. Clean up the schoolyard, park or waterway.
03. Understand the importance of natural resources and the need to manage and conserve them.	a. Understand the differences between renewable and nonrenewable resources.	i. Separate lunchroom trash into renewable and nonrenewable resources.
	b. Understand the conservation of natural resources.	i. Compare and contrast the different forms of transportation and their impact on natural resources, for instance, public transportation, automobiles, bicycles.
04. Understand different uses of technology in science and how they affect our standard of living.	a. Identify examples of technologies used in these scientific fields: <ul style="list-style-type: none"> - Food production; - Environmental cleanup; - Advances in medicine; - Communications; - The space program; - Weather forecasting. 	

612. HISTORY OF SCIENCE.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the significance of major scientific milestones.	a. Understand major contributions of various scientists and researchers.	i. Choose a scientist from a topic studied this year and explain how their contribution was significant to society.

613. INTERDISCIPLINARY CONCEPTS.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand that interpersonal relationships are important in scientific endeavors.	a. Work in teams to solve problems.	i. Work in cooperative teams to solve problems. ii. Given a problem, students attempt to solve individually then solve the same problem in groups. Compare results.
02. Understand technical communication.	a. Read, understand, and follow technical instructions.	i. Follow instructions to build a compound machine.

	b. Write a lab report.	
--	------------------------	--

614. -- 616. (RESERVED).

617. SCIENCE STANDARDS - GRADE 6, SECTIONS 618 THROUGH 628.

The samples associated with the content standards are meant to illustrate meaning and to represent possible areas of applications. They are not intended to be an exhaustive list, but are samples of applications that would demonstrate learning.

618. UNIFYING CONCEPTS OF SCIENCE.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand systems, order, and organization.	a. Know that a system is an organized group of related objects that form a whole.	i. Illustrate how different organisms interact with one another to create a desert ecosystem.
	b. Describe the function of each human body system.	
02. Understand concepts and processes of evidence, models, and explanation.	a. Know that observations and data are evidence on which to base scientific explanations and predictions.	i. Determine the speed of various wind-up toys and graph results. ii. Observe a pendulum and record data. Using this data, determine the variable that affects the period.
	b. Know the difference between observations and inferences.	i. Use happy/sad balls to determine the differences between observation and inference. ii. During a science experiment, discuss the difference between observation and inference.
	c. Use models to explain or demonstrate a concept.	i. Using gelatin, build a model of a cell. ii. Use block sets to investigate simple machines.
	d. Develop skills to create scientific explanations based on scientific knowledge, logic, and analysis.	i. Using the knowledge of levers, develop a plan to build a teeter-totter for the playground. Explain how two students of different weights would sit on a teeter-totter and balance it.
03. Understand constancy, change, and measurement.	a. Recognize that some concepts in science do not change with time.	i. Using marbles, demonstrate Newton's Laws of Motion.
	b. Analyze changes that occur in and among systems.	i. Graph the growth of a plant over time. ii. Given a specific body of water and location, research why water quality changes over time.
	c. Measure using standard and metric systems with an emphasis on the metric system.	i. Measure length, volume, mass, and temperature.

04. Understand the theory that evolution is a process that relates to the gradual changes in the universe and of equilibrium as a physical state.	a. Understand the relationships of past, present, and future.	i. Explain how soil is formed. ii. Give a presentation on the rock cycle.
05. Understand concepts of form and function.	a. Understand that the shape or form of an object or system is frequently related to its use or function.	i. Participate in an "Invention Convention" and design new products using recycled materials. ii. Analyze the different beaks of birds and explain how their adaptations help them. iii. Explain how the form of a human hand functions to pick up a tool. iv. Read and discuss <u>The Elephant's Child</u> by Rudyard Kipling.

619. CONCEPTS OF SCIENTIFIC INQUIRY.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand scientific inquiry and develop critical thinking skills.	a. Develop questions that can be answered by conducting scientific experiments.	i. What type of bridge would you build to test for maximum strength? ii. Given a regular soda and a diet soda, generate questions for investigations.
	b. Conduct scientific investigations using controls and variables when appropriate.	i. Design and build a bridge that will hold the maximum weight. ii. Conduct an experiment to test several brands of paper towels for absorbency.
	c. Select and use appropriate tools and techniques to gather and display data.	i. Graph class results using bridge data. ii. Use a calculator to determine averages of data.
	d. Analyze data in order to develop descriptions, explanations, predictions, and models using evidence.	i. Develop an explanation why one bridge held more weight than the other does.
	e. Develop a hypothesis based on observations.	i. Develop a plan for improving the bridge design. ii. Draw conclusions from individual or class data.
	f. Compare alternative explanations and predictions.	i. Rebuild and retest bridge. ii. Look for explanations that are not obvious.
	g. Communicate scientific procedures and explanations.	i. Write a proposal to a construction company describing best bridge to build. ii. Present data to the class in a meaningful way.

620. CONCEPTS OF PHYSICAL SCIENCE.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the structure and function of matter and molecules and their interactions.	a. Explore and describe the differences among elements, compounds, and mixtures.	i. Provide samples of different elements (lead, carbon, sodium, chloride). ii. Show different types of compounds (sodium chloride, water). iii. Have students create their own mixtures.
	b. Explore and calculate properties of matter.	i. Determine the density of several objects.
	c. Compare differences among solids, liquids, and gases using the concept of density: explore the effect of temperature on density.	i. Draw three circles on a paper representing solids, liquids, and gases and place the M&Ms in the circle to represent the molecules in the three phases of matter.
	d. Understand the nature of physical change and how it relates to physical properties.	i. Perform experiments, which are examples of a physical change (melting an ice cube and then heating water to change it to steam, beating egg whites, combining salt and heated water).
02. Understand chemical reactions.	a. Observe and know that substances react with each other to form new substances with different properties.	i. Place baking soda in a plastic self-sealing bag, pour in vinegar, and seal bag. Describe new properties.
03. Understand concepts of motion and forces.	a. Observe the effects of different forces (gravity and friction) on the movement, speed, and direction of an object.	
	b. Investigate different forms of energy.	i. List and give an example of the various forms of energy. ii. Perform various experiments demonstrating the different forms of energy.

621. CELLULAR AND MOLECULAR CONCEPTS.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the cell is the basis of form and function for all living things and how living things carry out their life functions.	a. Explore the different structural levels of which an organism is comprised: cells, tissues, organs, organ systems, and organisms.	i. Look at various types of cells under a microscope.
	b. Recognize the structural differences between plant and animal cells.	i. Create models of a plant cell and an animal cell.

	c. Explore the concept that traits are passed from parents to offspring.	i. Identify inherited traits such as rolling tongue and attached earlobe. ii. Be able to identify recessive and dominant genes using a Punnett Square (eye color, Mendel's peas).
--	--	--

622. INTERDEPENDENCE OF ORGANISMS AND BIOLOGICAL CHANGE.

Interdependence of Organisms and Biological Change standards do not apply at this grade level.

623. MATTER, ENERGY, AND ORGANIZATION IN LIVING SYSTEMS.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the relationship between matter, energy, and organization to trace matter as it cycles and energy as it flows through living systems and between living systems and the environment.	a. Know that the energy for life is primarily derived from the sun through photosynthesis.	i. Discuss the food factory concept of photosynthesis.

624. EARTH AND SPACE SYSTEMS.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand scientific theories of origin and subsequent changes in the universe and earth systems.	a. Investigate the interactions between the solid earth, oceans, atmosphere, and organisms.	i. Plate tectonics and continental drift. ii. Oceans affect climate. iii. Global warming. iv. Weather.
	b. Know the water cycle and its relationship to weather and climate.	
	c. Identify cumulus, cirrus, and stratus clouds and their relationship to weather changes.	
	d. Know that fossils are evidence of past life forms.	
02. Understand geo-chemical cycles and energy in the earth system.	a. Know the rock cycle and identify the three classifications of rocks.	i. Draw a poster that illustrates the rock cycle. ii. Given a box of rocks, identify which are igneous, metamorphic, and sedimentary.
	b. Know the layers and composition of the earth.	i. Create the layers of the earth inside a bowl with different flavors of ice cream discussing the layers as they are formed. ii. Unmold on a tray and create the continents with chocolate syrup. Eat and enjoy.

625. TECHNOLOGY.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the relationship between science and technology and develop the abilities of technological design and application.	a. Know that science and technology are human endeavors interrelated to each other, to society, and to the work place.	i. Discuss the concept that science is man's effort to understand his world. Technology assists man in this undertaking.
	b. Compare scientific inquiry and technological design in terms of activities, results, and influences on individuals and society: know that science enables technology and vice versa.	i. Discuss the inventions that resulted from the space program. ii. Participate in "Invention Convention."
	c. Create a tool to perform a specific function.	
	d. Use available and appropriate technology.	
	e. Explore the elements of technological design, which include the following: - Identify a problem; - Propose a solution; - Implement a proposed solution; - Evaluate the solution and its consequences; - Communicate the problem, process, and solution.	i. Graph results of a scientific experiment using a calculator or computer.

626. PERSONAL AND SOCIAL PERSPECTIVES.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand common environmental quality issues, both natural and human induced.	a. Identify issues for environmental studies.	i. Compile a case study of a local environmental issue and describe its impact on Idaho's economy.
02. Understand the causes and effects of population change.	a. Understand the effect of technological development and human population growth on the United States and/or the world.	i. Take a field trip to the local sewage treatment center or water treatment plant. ii. Clean up the schoolyard, park, or waterway. iii. Compare and contrast differences that countries face around the world.
03. Understand the importance of natural resources and the need to manage and conserve them.	a. Understand the differences between renewable and nonrenewable resources.	i. Collect trash and divide into renewable and nonrenewable resources.
	b. Understand the conservation of natural resources.	i. Research and debate the various viewpoints surrounding the Snake River dams in Idaho.

04. Understand different uses of technology in science and how they affect our standard of living.	a. Identify examples of technologies used in these scientific fields: - Food production; - Environmental cleanup; - Advances in medicine; - Communications; - The space program; - Weather forecasting.	i. Take field trips to various sites. ii. Research using the Internet.
--	---	---

627. HISTORY OF SCIENCE.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the significance of major scientific milestones.	a. Understand major contributions of various scientists and researchers.	i. Choose a scientist from a topic studied this year and explain how their contribution was significant to society.

628. INTERDISCIPLINARY CONCEPTS.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand that interpersonal relationships are important in scientific endeavors.	a. Work in teams to solve problems.	i. Find a community problem to work on as a class. ii. Work in teams of three or four to complete assigned labs.
02. Understand technical communication.	a. Read, understand, and follow technical instructions.	i. Build a model using the technical instructions.
	b. Write a lab report.	i. Write instructions for a lab procedure to be followed by another student who may have been absent.

629. -- 631. (RESERVED).

632. SCIENCE STANDARDS - MIDDLE GRADES, (GRADES 7-8) SECTIONS 633 THROUGH 643.

Based on the necessary math knowledge and skills, student maturation level, and the need for secondary level Physical Science exposure, it is recommended that Earth Science be scheduled at the middle school level. The standards reflect this recommendation.

The samples associated with the content standards are meant to illustrate meaning and to represent possible areas of applications. They are not intended to be an exhaustive list, but are samples of applications that would demonstrate learning.

633. UNIFYING CONCEPTS OF SCIENCE.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand systems, order, and organization.	a. Define and order small systems of a whole for the purpose of investigation.	i. Illustrate how different organisms interact with one another to create an ecosystem. ii. Illustrate the make up and interactions of the solar system using models. iii. Illustrate how compound machines are composed of many simple machines.

	b.	Know the different structural levels of which an organism is comprised: cells, tissues, organs, organ systems, and organisms.	i.	Create a model that shows how one structural level builds to the next by using triangles or bubbles as individual cells.
	c.	Know that there is order and predictability in the universe.	i. ii. iii.	Predict animal behaviors. Predict weather patterns. Predict how Newton's laws affect an object in space.
	d.	Know that patterns and similarities allow us to organize information about our universe.	i. ii. iii.	Use taxonomic key to classify organisms. Identify the major grouping of elements on the periodic table. Classify minerals by chemical composition.
02. Understand concepts and processes of evidence, models, and explanation.	a.	Use observations and data as evidence on which to base scientific explanations and predictions.	i. ii. iii.	Create a data table or graph showing the diversity of plants in a given area. Create a comparison graph showing the average temperature of two regions. Create a graph showing how the temperature of ice changes when adding salt.
	b.	Use observations to make defensible inferences.	i. ii.	Use discrepant events to make observations and inferences to explain them. Do "mystery box" activity (making observations and inferences).
	c.	Develop and/or use models to explain or demonstrate a concept.	i.	Build a model of an atom.
	d.	Develop scientific explanations based on scientific knowledge, logic, and analysis.	i.	Hypothesize why raisins in a glass of pop rise and fall.
03. Understand constancy, change, and measurement.	a.	Identify concepts in science that do not change with time.	i. ii. iii.	Demonstrate the law of conservation of mass and energy. (Apply to energy pyramid.) Demonstrate radioactive decay using marble activity. Speed of light.
	b.	Analyze changes that occur in and among systems.	i. ii.	Compare the elevation of Mt. Borah before and after the 1983 earthquake. Using model cars compare the speed at different points along a ramp.
	c.	Measure precisely in metric units using appropriate tools.	i.	Measure length, volume, mass (balance), weight (scale), and temperature.

04. Understand the theory that evolution is a process that relates to the gradual changes in the universe and of equilibrium as a physical state.	a. Understand the relationships of past, present, and future.	i. Compare fossils to living organisms. ii. Use rocks of today to document past changes in the earth.
	b. Understand that evolution refers to the biological, geological, or astronomical change over time.	i. Explain the changes that occurred in the peppered-moth. ii. Explain how a black hole develops. iii. Explain how land in the Pacific Northwest has changed over time.
	c. Understand that equilibrium is a physical state of balance in which changes and forces occur in opposite and offsetting directions.	i. Give an example of homeostasis. ii. Do an experiment demonstrating diffusion or osmosis. iii. Demonstrate how balanced forces affect motion or the size of a star.

634. CONCEPTS OF SCIENTIFIC INQUIRY.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand scientific inquiry and develop critical thinking skills.	a. Develop complex questions that can be answered by conducting long-term studies.	i. Generate a question about a local water issue. • macro invertebrates • coliform contamination • pH, temperature, nitrate, phosphates, turbidity, dissolved oxygen
	b. Design and conduct scientific investigations using controls and variables when appropriate.	i. Hypothesize an answer to the stated question. ii. Design and conduct experiment to answer the question about your local water issue.
	c. Select and use appropriate tools and techniques to gather and display data.	i. Use data probes, pH paper, dissolved O ₂ test kits, to obtain information. ii. Construct tables and graphs to display data.
	d. Analyze data in order to form conclusions.	i. Compare data obtained with national water quality standards. ii. Draw conclusions from individual or class data.
	e. Think critically and logically to accept or reject a hypothesis.	i. Explain why a hypothesis was accepted or rejected.
	f. Analyze alternative explanations and predictions.	i. Write a letter to the Department of Environmental Quality explaining results. ii. Formulate alternative hypotheses generated from collected data.

	g. Communicate and defend scientific procedures and explanations.	i. Write a letter to the Department of Environmental Quality defending the results. ii. Orally defend scientific results to classmates.
	h. Recognize the differences among observations, hypotheses, mathematical laws, and theories.	i. Research historical development of a law. • Newton's three laws • Law of gravity • Plate tectonics

635. CONCEPTS OF PHYSICAL SCIENCE.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the structure and function of matter and molecules and their interactions.	a. Understand that all matter is made up of atoms, which may be combined in various kinds, ways, and numbers.	i. Create a model of an atom.
	b. Use properties to identify matter.	i. Identify a mystery substance by describing its properties and calculating its density.
	c. Identify physical properties and know the nature of a physical change.	i. Demonstrate a phase change of a substance (ice to water).
02. Understand chemical reactions.	a. Demonstrate that chemical reactions may release or consume energy.	i. Demonstrate a chemical reaction that uses or releases heat.
03. Understand concepts of motion and forces.	a. Know how an object's position, direction of motion, and speed can be measured.	i. Describe and measure the distance and time a toy car travels and calculate its speed.
	b. Compare and contrast the relationships among different forms of energy.	
04. Understand that the total energy in the universe is constant.	a. Explain how energy can be transformed from one form to another but is neither destroyed nor created.	i. Observe Newton's Cradle (swinging balance balls) and explain how this shows that energy is neither created nor destroyed. ii. Compare and contrast potential and kinetic energy (pendulum).
	b. Understand that energy is transferred from one place to another.	i. Demonstrate how heat moves from a warmer object to a colder one until they both reach the same temperature.

636. CELLULAR AND MOLECULAR CONCEPTS.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the cell is the basis of form and function for all living things and how living things carry out their life functions.	a. Know the relationships among specialized cells, tissues, organs, organ systems, and organisms.	i. Given a cancer cell, predict how it will affect tissues, organs, organ systems, and the organism.
	b. Know the parts of plant and animal cells and the functions of the various cell structures.	i. Create a model of animal and plant cells showing organelles and describe the functions of each organelle. ii. Given a mystery slide or picture, distinguish whether it is a plant or animal cell.
	c. Know that most cell functions involve chemical reactions.	i. Diagram cell respiration.
	d. Know that genes and chromosomes carry the information for traits.	i. Use pipe cleaners to represent chromosomes and show how a gene on the chromosome carries a trait.
	e. Know that traits are inherited, including dominant and recessive traits.	i. Using Wisconsin fast plants, cross-pollinate plants and observe the rules of heredity.
	f. Know that genetic information is replicated and passed on to new cells.	i. Use models to demonstrate mitosis and meiosis.
	g. Know that transmission of chromosomal information to offspring occurs through asexual or sexual reproduction.	i. Grow or diagram how plants can reproduce sexually and asexually.

637. INTERDEPENDENCE OF ORGANISMS AND BIOLOGICAL CHANGE.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the theory of biological evolution.	a. Know that species change over time when random variations in individuals enhance their survival and reproductive success in a particular environment.	i. Do a simulation of the English Peppered-moth activity. ii. Compare beaks of finches of the Galapagos Islands.
	b. Know that species may become extinct when the environment changes and their adaptive characteristics are insufficient to allow their survival.	i. Research the extinction of a species.
	c. Know that biological classifications are based on similarities, which reflect their evolutionary relationships.	i. Classify an organism using a dichotomous key. ii. Compare two closely related species (coyote and wolf).

638. MATTER, ENERGY, AND ORGANIZATION IN LIVING SYSTEMS.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the relationship between matter, energy, and organization to trace matter as it cycles and energy as it flows through living systems and between living systems and the environment.	a. Know that the energy stored in food is primarily derived from the sun through photosynthesis.	
	b. Know that the distribution and abundance of organisms and populations in ecosystems are limited by the availability of matter and energy.	i. Complete and discuss the "Project Wild" How Many Bears Are in the Forest?
	c. Know that atoms and molecules cycle among the living and nonliving components of the biosphere.	i. Diagram photosynthesis and respiration (oxygen cycle). ii. Diagram the carbon cycle and nitrogen cycle.
	d. Trace energy flows through ecosystems in one direction, from photosynthetic organisms to herbivores to carnivores and decomposers.	i. Explain a food chain or the food pyramid, showing what happens to energy that came originally from the sun.
02. Understand the individual behavior of organisms and their interactions in populations and communities as influenced by physiological and environmental factors.	a. Know that organisms have behavioral responses to internal and external stimuli.	
	b. Know that living organisms have the capacity to produce populations of infinite size but that environments and resources are finite.	i. Start with a large bag of M&Ms. One student representing the first generation removes M&Ms with a spoon into a cup. One student representing the second generation removes M&Ms with a spoon into a cup. Allow each successive generation five seconds to fill cups until M&Ms are depleted. Discuss and relate to other finite resources.

639. EARTH AND SPACE SYSTEMS.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand scientific theories of origin and subsequent changes in the universe and earth systems.	a. Know that there are interactions among the solid earth, oceans, atmosphere, and organisms, which result in a change of the earth's system. (Some interactions are observable such as earthquakes and volcanic eruptions, but many take place over hundreds of millions of years.)	i. Explain the formation of the Hawaiian Islands.
	b. Compare earth with other planets with emphasis on conditions necessary for life.	i. Compare data from Mars with what is known about Earth regarding water, air, temperature, etc.
	c. Understand the motions that explain such occurrences as the day, the seasons, the year, phases of the moon, eclipses, and tides.	i. Create a model showing the earth, sun, and moon relationships.
	d. Know that the development of life caused dramatic changes in the composition of the earth's atmosphere.	i. Describe how the earth's atmosphere would be different if life had never developed. ii. Describe how the balance of gases in our atmosphere is maintained by living things.
	e. Know that the universe is constantly expanding.	i. Explain the Doppler Shift.
	f. Know that stars and galaxies have a life cycle.	i. Explain the evolution of a star.
	g. Know methods used to estimate geologic time (observing rock sequences, using fossils to correlate the sequences at various locations).	i. Create a sedimentary fossil record using layers of gelatin.
02. Understand geo-chemical cycles and energy in the earth system.	a. Know that earth systems have internal and external sources of energy.	i. Explain geothermal energy. ii. Explain why the poles are colder than the equator.
	b. Know that the earth's internal heat causes the plates of the earth's surface to move.	i. Explain the formation of the Hawaiian Islands.
	c. Know that the heating of the earth's surface and atmosphere by the sun drives convection within the atmosphere and oceans, producing winds and ocean currents affecting global climate.	i. Describe how solar heating of the earth drives the water cycle. ii. Describe why the oceans along the Pacific and Atlantic coasts are such different temperatures.

640. TECHNOLOGY.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the relationship between science and technology and develop the abilities of technological design and application.	a. Know that science and technology are human endeavors interrelated to each other, to society, and to the work place.	i. Explain how science has aided in the development of a technological device and how that device has aided in the advancement of science (electron microscope, computer).
	b. Compare and contrast scientific inquiry and technological design in terms of activities, results, and influence on individuals and society: know that science enables technology and vice versa.	i. Discuss inventions that resulted from the space program. ii. Participate in an "Invention Convention."
	c. Create a tool to perform a specific function.	
	d. Use available and appropriate technology.	
	e. Know the elements of technological design, which include the following: <ul style="list-style-type: none"> - Identify a problem; - Propose a solution; - Implement a proposed solution; - Evaluate the solution and its consequences; - Communicate the problem, process, and solution. 	i. Construct a device or product that will improve some aspect of human life or solve a problem (better mousetrap, faster toy car, stronger tool).

641. PERSONAL AND SOCIAL PERSPECTIVES.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand common environmental quality issues, both natural and human induced.	a. Identify environmental issues and conduct studies.	i. Compile a case study of a local environmental issue and describe its impact on Idaho's economy.
02. Understand the causes and effects of population change.	a. Understand the effect of technological development and the growth of human population on the living and nonliving components of the environment.	i. Take a field trip to the local sewage treatment center or water treatment plant. ii. Clean up the schoolyard, a park, or a waterway.
03. Understand the importance of natural resources and the need to manage and conserve them.	a. Explore alternative sources of energy.	i. Collect trash and divide into renewable and nonrenewable resources. ii. Visit a managed forest or mine.

	b. Understand the role and effect of management of natural resources.	i. Discuss the use of fire in a forest management program.
--	---	--

642. HISTORY OF SCIENCE.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the significance of major scientific milestones.	a. Understand the impact of historical scientific events.	i. Create a timeline showing scientific events.

643. INTERDISCIPLINARY CONCEPTS.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand that interpersonal relationships are important in scientific endeavors.	a. Work in teams to solve problems.	i. Conduct an experiment or activity while working on a team.
02. Understand technical communication.	a. Read, understand, and follow technical instructions.	i. Build a model using the technical instructions. ii. Follow lab procedure directions.
	b. Write and articulate technical information.	i. Write instructions for a lab procedure to be followed by another student.
	c. Write a long-term investigation.	

644. -- 646. (RESERVED).

647. SCIENCE STANDARDS. – GRADES 9 THROUGH 12, SECTIONS 648 THROUGH 658.

The samples associated with the content standards are meant to illustrate meaning and to represent possible areas of application. They are not intended to be an exhaustive list, but are samples of applications that would demonstrate learning.

648. UNIFYING CONCEPTS OF SCIENCE.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand systems, order, and organization.	a. Know the scientific meaning and application of the concepts of system, order, and organization.	i. Analyze, design, assemble, and trouble shoot systems mechanical, electrical, and biological with easily discernable components. ii. Discuss the value of thinking in terms of systems, order, and organization.
02. Understand concepts and processes of evidence, models, and explanation.	a. Know that observations and data are evidence on which to base scientific explanations.	i. Students use a stream table to explore concepts, such as river erosion, and compare the results for the table model to what is known about full-scale erosion models.

	b. Use models to explain how things work.	i. Build and demonstrate a model of the solar system.
	c. Develop scientific explanations based on scientific knowledge, logic, and analysis.	i. Through research explain the value of a recycling program.
03. Understand constancy, change, and measurement.	a. Identify constancy in some concepts in science that do not change with time such as the speed of light.	i. Define a meter in terms of distance traveled by light in a given period of time.
	b. Recognize that change occurs in and among systems and change can be measured.	i. Use demographic data to plot and explain population changes over a period of time.
	c. Measure in both the metric and U.S. customary system.	i. Record Celsius and Fahrenheit temperature readings over a period of time.
04. Understand the theory that evolution is a process that relates to the gradual changes in the universe and of equilibrium as a physical state.	a. Know that the present arises from materials and forms of the past.	i. Diagram the rock cycle. ii. Describe how soil forms.
	b. Understand evolution as a series of changes, some gradual and some sporadic, that account for present form and function of objects, organisms, and natural or mechanical systems.	i. Describe the earth's changes using plate tectonics as an example. ii. Describe the changes in Idaho's vegetation over the last 200 years and explain why they occurred.
	c. Know that equilibrium is a physical state in which forces and changes occur in opposite and offsetting directions.	i. Demonstrate Newton's laws of motion.
05. Understand concepts of form and function.	a. Know that form refers to function and function refers to form.	i. Describe how the foot of a frog and the shape of a leaf demonstrate form and function.

649. CONCEPTS OF SCIENTIFIC INQUIRY.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand scientific inquiry and develop critical thinking skills.	a. Identify questions and concepts that guide scientific investigations.	i. Design, build, and test a bridge for maximum strength. ii. Design an appropriate ecosystem for the front of your school. iii. Identify and solve a community problem or concern using the scientific method.
	b. Design and conduct scientific investigations.	

	c. Use technology and mathematics to improve investigations and communication.	
	d. Formulate and revise scientific explanations and models using logic and evidence.	
	e. Recognize and analyze alternative explanations and models.	
	f. Communicate and defend a scientific argument.	
	g. Know the differences among observations, hypotheses, and theories.	i. Compare Ptolomy's model of the universe to that of Copernicus.

650. CONCEPTS OF PHYSICAL SCIENCE.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the structure of atoms.	a. Know the function and location of protons, neutrons, and electrons.	i. Draw and label a diagram of an atom and list the functions of its components.
	b. Understand the processes of fission and fusion.	i. Compare and contrast the processes of fission and fusion.
	c. Know the characteristics of isotopes.	i. Describe the differences between carbon 12 and carbon 14.
	d. Know the basic electrical properties of matter.	i. Use static electricity to demonstrate attraction and repulsion of charged particles.
02. Understand the structure and function of matter and molecules and their interactions.	a. Know how atoms interact with one another by transferring or sharing electrons.	i. Using the periodic table, determine the atomic number and valence of a given element to predict types of bonding.
	b. Know how bonds between atoms are created when electrons are shared or transferred to form molecules or ionic substances.	i. Compare and contrast ionic and covalent bonds.
	c. Know how the physical properties of compounds reflect the nature of the interactions among its molecules.	i. Describe how molecular structure relates to crystal patterns.
	d. Know how solids, liquids, and gases differ in the energy that bonds them together.	i. Describe the energy level of water molecules as they pass through the three states of matter.

03. Understand chemical reactions.	a. Know that chemical reactions may release or consume energy.	i. Demonstrate exothermic and endothermic chemical reactions.
	b. Know that chemical reactions can occur in time periods that vary from very fast to very slow and that catalysts can affect the rate of a chemical reaction.	i. Demonstrate the change in rate of decay of hydrogenperoxide to water with and without an enzyme.
	c. Identify chemical reactions that are occurring all around us.	i. Identify and describe chemical reactions that occur in the home and community.
04. Understand concepts of motion and forces.	a. Know that gravitational force and electrical force are universal forces.	i. Describe the relationship between mass and weight. ii. Explain the role of electrical forces in the structure of the universe.
	b. Know that objects change their motion only when a net force is applied.	i. Build a CO ² powered car and demonstrate how an applied force affects its motion.
	c. Understand that moving electrical charges produce magnetic forces, and moving magnets produce electrical forces.	i. Build an electric motor and explain how it operates. ii. Explain the generation of electricity in a hydroelectric plant.
05. Understand that the total energy in the universe is constant.	a. Understand that energy can be transferred but it can neither be destroyed nor created.	i. Design and construct devices to transform/transfer energy.
	b. Know that energy can be classified as either potential energy, kinetic energy, or energy contained by a field.	i. Describe the difference between kinetic and potential energy and give examples of each.
	c. Know that heat is evidenced by random motion and the vibrations of atoms, molecules, and ions.	i. Observe the changes in the physical properties of milk as it is heated on a microscope slide.
	d. Know that energy is transferred by various types of waves and by electrons flowing through matter.	i. Explain the basic properties of the electromagnetic spectrum.

651. CELLULAR AND MOLECULAR CONCEPTS.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the cell is the basis of form and function for all living things and how living things carry out their life functions.	a. Know that cells have particular structures that underlie their functions.	i. Explain how the structure and function of a cell are similar to the organizational structure and function of a school.
	b. Know that most cell functions involve chemical reactions.	i. Explain the chemical basis for cell respiration.

	c. Know that cells store and use information in the form of DNA to guide their functions.	i. Describe the similarities and differences between DNA transcription and making multiple copies of student records on an office copy machine.
	d. Know that cell functions are regulated by expressed genes that provide code for the synthesis of proteins.	i. Explain how protein is produced at the cellular level.
	e. Know that cellular differentiation is regulated through the expression of different genes. A single cell can differentiate to form many specialized cells, tissues, and organs.	
02. Understand the form and function of DNA.	a. Know that the instructions for specifying the characteristics of the organism are carried in DNA.	i. Explain what we mean by genetic mapping.
	b. Know that genetic information is both encoded in genes and replicated.	i. Compare the process of mitosis and meiosis.
	c. Know that most of the cells in a human contain 23 pairs of chromosomes, and that transmission of chromosomal information to offspring occurs through the combination of egg and sperm cells.	i. Compare the process of mitosis and meiosis.
	d. Know that changes in DNA (mutations) occur spontaneously at low rates. Some of these changes make no difference to the organism whereas others can change cells and organisms. Only mutations in gametes can create the variation that changes an organism's off-spring.	i. Explain how mutations of an organism's DNA may result in birth defects.
	e. Know that DNA plays a major role in health issues. Through the development of new technologies we have discovered new information about the human genome, medical disorders, and forensic sciences.	i. Find an example of the role of DNA in health issues.

652. INTERDEPENDENCE OF ORGANISMS AND BIOLOGICAL CHANGE.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the theory of biological evolution.	a. Know that the theory of evolution explains how species evolve over time and how evolution is the consequence of interactions of: <ul style="list-style-type: none"> - Potential of a species to increase its numbers; - Genetic variability; - A finite supply of resources; - Selection by the environment of those offspring better able to survive and leave offspring. 	i. Trace the evolution of a species. ii. Explain why some species have changed little over time and others have become extinct.
	b. Know that natural selection and its evolutionary consequences provide a scientific explanation for the fossil record of ancient life forms, as well as for the striking molecular similarities observed among the diverse species of organisms.	
	c. Know that the theory of evolution explains how different species of plants, animals, and microorganisms that live on earth today are related by descent from common ancestors.	i. Identify the ancestors of a present day species.
	d. Know that biological classifications are based on similarities, which reflect their evolutionary relationships.	i. Classify an organism using a dichotomous key.
02. Understand the interdependence of organisms.	a. Know that atoms and molecules cycle among the living and nonliving components of the biosphere.	i. Diagram the nitrogen cycle.
	b. Trace energy flows through ecosystems in one direction, from photosynthetic organisms to herbivores to carnivores and decomposers.	i. Explain a food chain.
	c. Know that organisms both cooperate and compete in ecosystems.	i. Explain niches in an ecosystem.

	d. Know that living organisms have the capacity to produce populations of infinite size, but environments and resources are finite.	i. List limiting factors of a population in a closed environment.
	e. Know that human beings live within the world's ecosystems. Increasingly, humans modify ecosystems as a result of population growth, technology, and consumption.	i. Conduct an extended investigation of a local environment affected by human actions.

653. MATTER, ENERGY, AND ORGANIZATION IN LIVING SYSTEMS.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the relationship between matter, energy, and organization to trace matter as it cycles and energy as it flows through living systems and between living systems and the environment.	a. Know that all matter tends toward more disorganized states.	i. Explain entropy.
	b. Know that living systems require a continuous input of energy to maintain their chemical and physical organization.	i. Explain why all organisms need food.
	c. Know that the energy for life is primarily derived from the sun through photosynthesis.	i. Provide evidence that green plants make food and in the significance of this process to other organisms.
	d. Understand cellular respiration and the synthesis of macromolecules.	i. Describe how energy is derived to carry out various functions in organisms.
	e. Know that chemical bonds of food molecules contain energy, which is released when the bonds are broken.	i. Describe the chemical processes of cellular respiration.
	f. Know that cells usually store energy as Adenosine Triphosphate (ATP).	i. Describe the chemical processes of cellular respiration.
	g. Know that the distribution and abundance of organisms and populations in ecosystems are limited by the availability of matter and energy.	i. Describe the relationship between the food supply and the distribution and abundance of a species.

	h. Trace how matter cycles and energy flows through different levels of organization of living systems - cells, organs, organisms, communities - and between living systems and the physical environment.	i. Construct a food web for a community of organisms and explain how elimination of a particular part of a chain affects the rest of the chain and web. Diagram the carbon and oxygen cycles.
02. Understand the individual behavior of organisms and their interactions in populations and communities as influenced by physiological and environmental factors.	a. Know that multi-cellular animals have nervous systems that generate behavior.	i. Demonstrate how an organism responds to various stimuli.
	b. Know that the nerve cells communicate with each other by secreting specific excitatory and inhibitory molecules.	i. Explain the interaction of neurotransmitters and psychoactive drugs.
	c. Know that organisms have behavioral responses to internal changes and to external stimuli., The and that broad patterns of behavior have evolved to ensure reproductive success.	i. Describe the mating behavior of a particular animal species.
	d. Know that behaviors often have an adaptive logic when viewed in terms of natural selection.	i. Record and compare the behaviors of animals in their natural habitats and relate how these behaviors are important to the animals.

654. EARTH AND SPACE SYSTEMS.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand scientific theories of origin and subsequent changes in the universe and earth systems.	a. Know that current scientific theory suggests that the Sun, the Earth, and the rest of the solar system formed from a nebular cloud of dust and gas.	i. Design a poster illustrating the "Big Bang" theory.
	b. Know methods used to estimate geologic time (observing rock sequences and using fossils to correlate the sequences at various locations).	i. Explain why trilobites make excellent index fossils and why they are extremely useful in determining the appropriate age of rocks.

	c.	Know that interactions among the solid earth, the oceans, the atmosphere, and organisms have resulted in the ongoing change of the earth system. Some activities are observable (earthquakes and volcanic eruptions) but many take place over hundreds of millions of years.	i.	Explain the processes involved in the formation of Hell's Canyon or the Snake River Canyon.
	d.	Know that the development of life caused dramatic changes in the composition of the earth's atmosphere.	i.	Describe how the earth's atmosphere would be different if life never developed on earth.
	e.	Know that the universe is constantly expanding.	i.	Explain how the Doppler shift of light from distant galaxies is used by scientists to provide evidence that the universe is expanding.
	f.	Know the life history of stars and galaxies.	i.	Explain how black holes are formed.
02. Understand geo-chemical cycles and energy in the earth system.	a.	Know that earth systems have internal and external sources of energy, both of which create heat. The sun is the major external source of energy.	i.	Describe the ways in which solar energy that is not reflected back into space affects the earth (creating heat, causing the water cycle, causing atmospheric and oceanic convection currents, involved in photosynthesis).
	b.	Know that the two primary sources of internal energy are the decay of radioactive isotopes and the gravitational energy from the earth's original formation.	i.	Discuss how the decay of radioactive elements drives the convection currents within the earth's mantle according to some theories.
	c.	Know that the outward transfer of earth's internal heat drives convection circulation in the mantle that propels the plates comprising the earth's surface across the face of the globe.	i.	Describe how the Hawaiian Islands were formed.
	d.	Know that the heating of the earth's surface and atmosphere by the sun drive convection within the atmosphere and oceans, producing winds and ocean currents.	i.	Explain how solar energy contributes to ocean current patterns.
	e.	Know that global climate is determined by energy transfer from the sun at and near the earth's surface.	i.	Explain why many scientists are concerned about the greenhouse effect.

	f. Know that the movement of matter through the solid earth, oceans, and atmosphere is driven by the earth's internal and external sources of energy. These movements are often accompanied by a change in the physical and chemical properties of matter.	i. Describe the physical and chemical changes that occur at the different stages of the rock cycle.
--	--	---

655. TECHNOLOGY.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the relationship between science and technology and develop the abilities of technological design and application.	a. Know the ways that science advances technology and technology advances science.	i. Write a paper highlighting how technology has advanced science and how science has advanced technology such as the telescope, microscope, computer chips, etc.
	b. Recognize that science and technology are pursued for different purposes and that scientific inquiry is driven by the desire to understand the natural world and technological design is driven by the need to meet human needs and solve human problems.	i. Compile a case study of a technological development that has had a significant impact on the environment.
	c. Know that critical thinking, creativity, imagination, and a good knowledge base are all required in the work of science and engineering.	i. Identify a natural resource problem or concern and utilize the scientific process to study the problem or concern and identify what technology is available to assist the process.
	d. Know the elements of technological design, which include the following: <ul style="list-style-type: none"> - Identify a problem or design an opportunity; - Propose designs and choose between alternative solutions; - Implement a proposed solution; - Evaluate the solution and its consequences; - Communicate the problem, process, and solution. 	i. Identify a natural resource problem or concern and utilize the scientific process to study the problem or concern and identify what technology is available to assist the process.

	e. Use available technology to assist in solving problems.	i. Use computer models to simulate problems and determine “what if” scenarios. ii. Use current computer software to develop reports and other documents to communicate information.
--	--	--

656. PERSONAL AND SOCIAL PERSPECTIVES.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand common environmental quality issues, both natural and human induced.	a. Identify issues, including but not limited to: - Water quality; - Air quality; - Hazardous waste; - Forest health.	i. Compile a case study of a local environmental issue and describe its impact on Idaho's economy.
02. Understand the causes and effects of population change.	a. Understand the impact of technological development and the growth of human population on the living and nonliving environment.	i. Determine the impact of a changing population on local land use.
	b. Understand the impact of population change on natural resources and community infrastructure.	i. Develop a model of a community that describes the impact on natural resources and community infrastructure as the population changes.
03. Understand the importance of natural resources and the need to manage and conserve them.	a. Understand the differences between renewable and nonrenewable resources.	i. Develop a list of renewable and non-renewable resources.
	b. Understand the differences between preservation and conservation.	i. Investigate the roles of agencies charged with the preservation of natural resources as opposed to conservation and use.
	c. Understand the role and effect of management of natural resources.	i. Examine the role one of our state or federal natural resource agencies and discuss its role in the management of our public lands.
04. Understand different uses of technology in science and how they affect our standard of living.	a. Identify examples of technologies used in scientific fields, including but not limited to: - Weather forecasting; - Food production; - Environmental cleanup; - Advances in medicine; - Communications; - The space program.	i. Identify specific technologies used in a particular scientific field and how they have affected our standards of living.

657. HISTORY OF SCIENCE.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the significance of major scientific milestones.	a. Understand the social and economic impact of historical scientific events.	i. Watch a video about a significant scientific event such as the Apollo 13 mission and interview an adult on their reaction at the time of the event.
	b. Understand the contributions of notable scientists.	i. Read and report about a notable scientist.

658. INTERDISCIPLINARY CONCEPTS.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand that interpersonal relationships are important in scientific endeavors.	a. Know the importance of working in interdisciplinary teams to solve scientific problems.	i. While working in a team, use the information learned in classes such as health, English, math, and social studies to study an environmental issue.
02. Understand technical communication.	a. Read for information.	i. Assemble a model using the instructions supplied from the manufacturer and write a report on suggested revisions to the instructions.
	b. Write and articulate technical information.	i. Assemble a model using the instructions supplied from the manufacturer and write a report on suggested revisions to the instructions.